

BULLETIN OF MISCELLANEOUS INFORMATION No. 5 1935 ROYAL BOTANIC GARDENS, KEW

XXI—A CLASSIFICATION OF THE CULTIVATED SORGHUMS: J. D. SNOWDEN.

A revision of the cultivated Sorghums of Tropical Africa by the late Dr. Stapf was published in Prain, Fl. Trop. Afr. 9, 104-154 (1917). The material available for that work was very inadequate and it was due to Stapf's unique knowledge of the genus that he was able to produce such an excellent classification of the species and varieties from such specimens as he had at his disposal. Unfortunately at that time he was unable to obtain access to the types of many African varieties, but he included a list of most of these at the end of his classification under "Imperfectly known species and varieties." Since that date a very large collection of these plants has been gathered together from various parts of the world, especially from Africa and Asia, among which were found many varieties hitherto unrepresented in the Kew Herbarium. It was realized that this collection could not be satisfactorily named and arranged without a revision of all the named varieties of cultivated Sorghums. This work has taken a long time to complete as there were so many specimens to be examined, numerous types to compare, and much literature to consult. An outline of the classification proposed is given below, together with descriptions of new series, species and varieties, as well as the necessary new combinations. A complete account of the revision and an enumeration of the specimens, together with historical, cultural and economic notes on the species, will be published later.

The classification here proposed mainly follows that adopted by Stapf, in recognizing the more distinct types as species and grouping under them one or more varieties which have several characters in common. It should be noted, however, as Stapf has already pointed out (l.c. 105 : 1917 ; 955 : 1934), that the groups of cultivated Sorghums must be considered on a different basis from those of the wild types, and, although binomial names have been given for practical reasons, such classification is mainly of an artificial character, which it is hoped may prove useful to those workers who are studying these plants. The species are grouped into six subseries, and the repetition of varietal names under different species is avoided, in order that those who prefer to treat the cultivated Sorghums as one large composite species, under *Sorghum vulgare* Pers., may still make good use of the arrangement of the varieties which is provided.

The writer wishes to express his thanks to various members of the Kew Herbarium Staff, and especially to Mr. C. E. Hubbard, for

their kind assistance during the preparation of this revision and also to all those botanical institutions and agricultural departments which have furnished specimens for examination. A list of these, together with those who have assisted in collecting the material, will be included in the full account of the revision.

Sorghum Moench, Meth. Pl. 207 (1794) ; Pers. Syn. Pl. 1, 101 (1805) ; Stapf in Prain, Fl. Trop. Afr. 9, 104 (1917).

The genus *Sorghum* as understood by Stapf was divided into two sections, *Eu-Sorghum* and *Sorghastrum*. The latter is sufficiently distinct to be retained as a separate genus as already described by Nash (in Britton, Mann. Fl. N.U.S. 71: 1901). It need not be further considered here as it bears no close relationship to the wild and cultivated Sorghums in Stapf's remaining section.

The section *Eu-Sorghum* Stapf (l.c. pp. 111-140, species nos. 1-27) comprises two well-marked groups of species which are separated below into distinct sections.

Sect. I. **Eu-Sorghum.**

Vaginae nodi glabri vel tenuiter pubescentes, haud barbati ; paniculae rami primarii divisi (saltem inferiores) ; racemi laterales et terminales.

This section includes the species nos. 1-24 described by Stapf (l.c. pp. 111-137) and forms the major portion of the genus.

Sect. II. **Para-Sorghum.**

Vaginae nodi barbati (saltem superiores) ; paniculae rami simplices ; racemi terminales ; gramina spontanea.

The species of this section have probably had a different origin from those in the previous section. It contains about 8 to 10 annual and perennial species, including the following :—*Sorghum versicolor* J. N. Anderss., *S. purpureo-sericeum* Aschers. et Schweinf., *S. dimidiatum* Stapf and *S. nitidum* Pers. The area of its distribution extends from Northern Transvaal to the Sudan, through India to China, the Malayan Region and Australia. The species which have been cytologically examined differ from those in section *Eu-Sorghum* in having only 10 chromosomes.

The section **Eu-Sorghum** may be divided into two subsections as described below :—

Subsect. A. **Arundinacea.**

Gramina annua vel raro perennia sed tunc sine rhizomatibus.

This is the largest and most important of the two subsections of *Eu-Sorghum*. The chromosome number is 20 in those species which have so far been examined.

Subsect. B. **Halepensia.**

Gramina perennia spontanea, e rhizomate elongato orta.

This subsection is restricted to *Sorghum halepense* (Linn.) Pers. and possibly one or two other species. Their area of distribution extends throughout the Mediterranean Region and eastward to India. At one time *Sorghum halepense* was considered the original ancestor of the cultivated races but this is very improbable, as besides possessing rhizomes it has 40 chromosomes.

The subsection *Arundinacea* comprises two distinct series :—

Series a. **Spontanea.**

Racemi fragiles ; spiculae sessiles maturae facile deciduae ; caryopsides plerumque breves et inter glumas omnino inclusae ; gramina spontanea.

This series embraces the species nos. 1–10 described by Stapf (l.c. pp. 111–120). They are most abundant in Tropical Africa. A few, such as *Sorghum sudanense* Stapf and *S. virgatum* Stapf, have been cultivated for fodder.

Series b. **Sativa.**

Racemi tenaces ; spiculae sessiles maturae persistentes ; caryopsides glumis longiores vel saltem multo expositae, raro inclusae ; gramina culta.

Those species which are generally cultivated for their grain or sweet stems are all contained in this series. It is subdivided into the following subseries :—i *Drummondii*, ii *Guineënsia*, iii *Nervosa*, iv *Bicoloria*, v *Caffra*, vi *Durra*, which are dealt with below.

SUBSERIES i. DRUMMONDII.

Spiculae plus minusve lanceolatae, ellipticae vel oblongae, sub-anthesi plerumque duplo longiores quam latiores, latitudine maxima supra medium nunquam reperta, nunquam transverse rugosae neque circa medium depressae ; glumae fere omnino coriaceae regione apicali excepta nervis plerumque obscuris ; caryopsides inclusae vel fere inclusae, maturae glumis paullo longioribus arcte comprehensae ; pedicelli longiusculi et graciles, plerumque 2–4 mm. longi ; panícula laxa vel raro contractiuscula, haud dense compacta.

1. **S. aterrimum** Stapf in Prain, Fl. Trop. Afr. 9, 121 (1917).

(1). Var. **transiens** (Hack.) Snowden, comb. nov. *Andropogon Sorghum* subsp. *sativus* var. *transiens* Hack in DC. Monogr. Phan. 6, 508 (1889).

AUSTRIA : St. Polten, ex Hort. Odessa (typus in Herb. Vindob.).

(2). Var. **angustum** Snowden, var. nov.; a var. *transeunte* (Hack.) Snowden differt panícula anguste elliptica vel anguste oblonga, ramis suberectis brevibus nonnihil axi primario adpressis, lemmate superiore spiculae sessilis inermi vel raro breviter aristato, caryopside biconvexa, scutello plus minusve obscuro..

ANGLO-EGYPTIAN SUDAN : Bahr el Ghazal ; Jur Ghattas, Schweinfurth 2590 (typus).

2. **S. Drummondii** (Steud.) *Millspaugh et Chase*, Field Columb. Mus. Publ. Bot. **3**, 21 (1903); *Stapf* in Prain, Fl. Trop. Afr. **9**, 122 (1917). *Andropogon Drummondii* Steud. Syn. Pl. Glum. **1**, 393 (1854).

UNITED STATES : New Orleans, *Drummond* 588 (typus).

3. **S. nitens** (Busse et Pilger) *Snowden*, stat. nov. *Andropogon Sorghum* var. *nitens* Busse et Pilger in Engl. Bot. Jahrb. **32**, 189 (1902). Affine *S. Drummondii* (Steud.) *Stapf* sed spiculis sessilibus angustioribus elliptico-lanceolatis, lemmate superiore mucronato differt.

TANGANYIKA TERRITORY : Ugogo ; Nsali, *Busse* 1182 (typus in Herb. Berol.)

SUBSERIES ii. GUINEËNSIA.

Spiculae sessiles, pedicelli et panicula ut in subser. *Drummondii* ; caryopsides maturae inter glumas plus minusve hiantes plerumque valde obviae, glumis breviores vel aequilongae vel si longiores tum plus minusve applanatae et compressae, saepe inter glumas obliquae, demum facile deciduae, raro biconvexae et infra glumam alteram vel utramque comprehensae (cf. *S. exsertum* *Snowden* et *S. mellitum* *Snowden*).

4. **S. margaritiferum** *Stapf* in Prain, Fl. Trop. **9**, 125 (1917).

(1). Var. **margaritiferum** *Snowden*, stat. nov. *S. margaritiferum* *Stapf*, l.c.

FRENCH GUIANA : Bilima, *Chevalier* 15861 (typus).

(2). Var. **ovuliferum** (*Hack.*) *Snowden*, comb. nov. *Andropogon Sorghum* subsp. *sativus* var. *ovulifer* *Hack.* in DC. Monogr. Phan. **6**, 510 (1889).

GAMBIA : *Boteler* (typus in Herb. Vindob.)

(3). Var. **tremulans** (*Stapf*) *Snowden*, comb. nov. *Sorghum guineëse* *Stapf* var. *tremulans* *Stapf*, l.c. 124 (pro parte).

NORTHERN NIGERIA : Sokoto Province, *Dalziel* 518 (typus).

5. **S. guineëse** *Stapf* in Prain, Fl. Trop. Afr. **9**, 123 : 1917 (excl. var. *tremulans* *Stapf* et var. *robustum* *Stapf*).

(1). Var. **involutum** *Stapf*, l.c. 124.

NORTHERN NIGERIA : Nupe, *Baikie* (typus).

(2). Var. **amphibolum** (Busse et Pilger) *Snowden*, comb. nov. *Andropogon Sorghum* var. *amphibolus* Busse et Pilger in Engl. Bot. Jahrb. **32**, 184 (1902).

DAHOMÉY : Sokode, *Kersting* 19 (typus in Herb. Berol.)

(3). Var. **intermedium** (Busse et Pilger) Snowden, comb. nov. *Andropogon Sorghum* var. *intermedius* Busse et Pilger, l.c. 185.

DAHOMÉY : Sokode, Kersting 5 (typus in Herb. Berol.)

(4). Var. **pendulum** (Pilger) Snowden, comb. nov. *Andropogon Sorghum* var. *pendulus* Pilger in Notizbl. Bot. Gart. Berl. 4, 147 (1904).

DAHOMÉY : (Togoland), Kersting (typus in Herb. Berol.).

(5). Var. **aristatum** Snowden, var. nov.; affine var. *involuta* Stapf, sed spiculis sessilibus minusculis 5-6.5 mm. longis, arista lemmatis superioris 12-16 mm. longa, caryopsidibus plano-convexis apice acutiusculis, regione nucellari fusca differt.

ANGLO-EGYPTIAN SUDAN : Bahr el Ghazal, Punter 37 (typus).

(6). Var. **scintillans** Snowden, var. nov.; a var. *involuta* Stapf differt, spiculis sessilibus minusculis 5-6.5 mm. longis, maturis nigro-brunneis vel nigris nitentibus, lemmate superiore plerumque breviter aristato, caryopsidibus glumis multo brevioribus parvis 4-4.5 mm. longis maturis gluma altera vel utraque basin versus comprehensis.

NORTHERN NIGERIA : Ilorin road, 60 miles from Ibadan., Sampson 46 (typus).

6. **S. mellitum** Snowden, sp. nov.; affine *S. guineënsi* Stapf et *S. Dochna* (Forssk.) Snowden, ab illo spicularum sessilium glumae inferioris carinis angustissime alatis, caryopsidibus minus applanatis, spiculis pedicellatis persistentibus, culmis dulcibus, ab hoc spiculis sessilibus infra medium vel circa medium latioribus, caryopsidibus a spiculis sessilibus forma diversis neque glumis arcte comprehensis, pedicellis longioribus differt.

Culmi 2.5-5 m. alti, dulces. *Panicula* laxa vel contractiuscula, oblonga, lanceolato oblonga vel lanceolato-elliptica nonnunquam umbelliformis, 25-40 cm. longa, 8-15 cm. lata; rami parte basali excepta graciles, flexuosi et nutantes vel nonnunquam rigidiusculi, inferiores 5-25 cm. vel ultra longi. *Spiculae* sessiles ellipticae vel elliptico-ovatae, acutae, 5-6.5 mm. longae, usque ad 3.5 mm. latae, glabrescentes vel margines versus sparse strigillosae. *Glumae* aequales, coriaceae, regione apicali excepta obscure nervosae; inferior supra medium carinis angustissime alatis vel carinis obscuris scabridis. *Lemmata* hyalina, tenuiter ciliata; superius mucronatum vel arista usque ad 12 mm. longa praeditum. *Caryopsides* maturae glumis aequilongae vel paullo breviores, gluma altera vel utraque comprehensae, raro fere inclusae, 3.5-4.5 mm. longae, 2.5-3.5 mm. latae, dorso ellipticae, vel late ellipticae vel leviter obovato-ellipticae, biconvexae vel facie nonnihil applanatae, plus minusve flavae, rubrae vel brunneae. *Spiculae pedicellatae* lineari-lanceo-

latae vel subulatae, 4-6 mm. longae, steriles vel raro ♂, maturae persistentes, pedicellis graciliculis 2-3 mm. longis.

NORTHERN NIGERIA: Sokoto, *Frampton* per *Glendon Hill* 13 (typus).

(1). Var. **mellitum** *Snowden*, var. nov. Panicula laxa, nonnunquam umbellata; rami graciles, saepe nutantes, 10-25 cm. vel ultra longi; caryopsides 4-4.5 mm. longae, 3-3.5 mm. latae, plus minusve rubido-brunneae.

NORTHERN NIGERIA: Sokoto, *Frampton* per *Glendon Hill* 13 (typus).

(2). Var. **australe** *Snowden*, var. nov.; affine var. *mellito* *Snowden*, sed panicula contracta densiuscula, rhachi plus minusve abdita, ramis suberectis rigidiusculis 5-10 cm. longis, caryopsidibus angustiusculis 2.5-3 mm. latis, flavidis vel rubidis differt.

SOUTH AFRICA: Western Transvaal; Rustenburg, *Pretoria Div.* Bot. 28 (typus).

7. **S. conspicuum** *Snowden*, sp. nov.; affine *S. guineënsi* Stapf et *S. Roxburghii* Stapf, ab illo spicularum sessilium gluma inferiore ecarinata vel prope apicem breviter bicarinata, spiculis pedicellatis persistentibus raro deciduis, panicula plus minusve pilosa, ab hoc spiculis majoribus et angustioribus, caryopsidibus multo compressis applanatis plerumque majoribus differt.

Culmi validi, 3-4.5 m. alti, insulsi vel raro dulces. *Folia* 15-21; laminae usque ad 1 m. longae et 10 cm. latae. *Panicula* laxa vel raro nonnihil contracta, oblonga vel elliptica nonnunquam subumbellata, 20-55 cm. longa, 8-20 cm. lata; pedunculus erectus vel raro recurvus (cf. var. *orientale* *Snowden*); rami suberecti et prope basin validiusculi, ceteri graciles, patuli, flexuosi, prope basin et axillis ramulorum pubescentes vel villosi, inferiores 10-25 cm. longi vel paniculae aequilongi. *Spiculae* sessiles elliptico-lanceolatae vel ellipticae, acutae vel acuminatae, 5.5-7.5 mm. longae, 2-4.5 mm. latae, demum glabrescentes vel raro semper strigoso-hirsutae. *Glumae* aequales, coriaceae, regione apicali excepta obscure nervosae; inferior mox convexa, ecarinata vel prope apicem breviter bicarinata, carinis dentibus minutis terminatis. *Lemmata* hyalina, moderate ciliata; superius mucronatum vel plerumque arista 5-12 mm. longa praeditum. *Caryopsides* maturae inter glumas late hiantes plerumque longiores obviae, dorso ovatae vel ovato-rotundae vel rotundatae, 4-6 (raro 3.5) mm. longae, 4-5 (raro 3) mm. latae, moderate vel valde compressae, albidae, flavae vel rubrae, regione nucellari haud colorata [excl. var. *callomelan* (K. Schum.) *Snowden*]. *Spiculae pedicellatae* lineari-lanceolatae vel subulatae, ♂ vel steriles, 5-7 mm. longae, maturae persistentes vel raro deciduae [cf. var. *pilosum* *Snowden* et var. *callomelan* (K. Schum.) *Snowden*], pedicellis gracilibus 2-3 mm. longis.

TANGANYIKA TERRITORY: Rufiji District, *Wakefield* 9 (typus).

(1). Var. **conspicuum** Snowden, var. nov. *Panicula* laxa ; rami graciles, patuli, inferiores 10–25 cm. longi vel paniculae aequilongi. *Spiculae sessiles* 6–7·5 mm. longae, 2·5–4·5 mm. latae, maturae glabrescentes ; gluma inferior ecarinata vel prope apicem breviter bicarinata ; lemma superius mucronatum vel arista usque ad 5 mm. longa praeditum ; caryopsides 5–6 mm. longae, 4–5 mm. latae, plerumque albiae vel eburneo-flavae, nonnunquam rubrae. *Spiculae pedicellatae* persistentes.

TANGANYIKA TERRITORY : Rufiji District, *Wakefield* 9 (typus).

(2). Var. **rhodesianum** Snowden, var. nov.; affine var. *conspicuo* Snowden, sed ramis sub anthesi axi primario adpressis tandem patentibus, gluma inferiore prope apicem distincte bicarinata, carinis dentibus minutis terminatis differt.

NORTHERN RHODESIA : Mazabuka, *Moore* 43/1931 (typus).

(3). Var. **rubicundum** Snowden, var. nov. *Panicula* laxa ; rami graciles, patentes, usque ad 25 cm. vel ultra longi, ramulis primo lucide rubido-tinctis. *Spiculae sessiles* 5·5–6·5 mm. longae, primo apice rubidae ceterum stramineae vel pallide brunneae ; gluma inferior prope apicem bicarinata ; lemma superius mucronatum ; caryopsides 4·5–5 mm. longae, 3·5–4 mm. latae, rufae vel ferrugineae. *Spiculae pedicellatae* persistentes, primo rubido-tinctae.

SOUTH NYASALAND : Barker C 28/1929 (typus).

(4). Var. **validum** Snowden, var. nov.; a var. *rubicundo* Snowden differt panicula validiore, rhachi valida vel validissima, ramis basin versus validioribus et rhachi nonnihil appressis haud rubido-tinctis, spiculis pedicellatis et apicibus spicularum sessilium haud rubido-tinctis, caryopsidibus albidis vel eburneo-flavis.

NORTHERN RHODESIA : Mazabuka, *Moore* 57/29 (typus).

(5). Var. **usaramense** (*Busse et Pilger*) Snowden, comb. nov. *Andropogon Sorghum* var. *usaramensis* Busse et Pilger in Engl. Bot. Jahrb. 32, 184 (1902).

TANGANYIKA TERRITORY : Usaramo ; Kisserawe, *Busse* 395 (typus in Herb. Berol.)

(6). Var. **orientale** Snowden, var. nov. *Panicula* laxa, lanceolata vel pyramidalis ; pedunculus erectus vel recurvus ; rami basi basali excepta graciles et flexuosi. *Spiculae sessiles* anguste elliptico-lanceolatae, acuminatae, 5·5–6 mm. longae, 2–3 mm. latae ; glumae tenuiter coriaceae ; lemma superius aristatum vel mucronatum ; caryopsides 3·5–4·5 mm. longae, 3–3·5 mm. latae. *Spiculae pedicellatae* persistentes.

INDIA : Bihar & Orissa ; Bhagalpur, *Alam* 6 (typus).

(7). Var. **pilosum** Snowden, var. nov.; affine var. *conspicuo* Snowden, sed spiculis sessilibus dense pilosis vel dorso glumarum

raro nonnihil glabrescentibus, lemmate superiore plerumque arista usque ad 12 mm. longa praedito raro mucronata, spiculis pedicellatis saepe deciduis, pedicellis dense ciliatis differt.

TANGANYIKA TERRITORY : Tabora District, *Dept. Agric.* 295 (typus).

(8). Var. **callomelan** (*K. Schum.*) *Snowden*, comb. nov. *Andropogon Sorghum* var. *callomelaena* K. Schum. in Engl. Pfl. Ost-Afr. B. 40 (1895).

TANGANYIKA TERRITORY : Mamboya, *Stuhlmann* 4321 (typus in Herb. Berol.).

8. **S. Roxburghii** *Stapf* in Prain, Fl. Trop. Afr. 9, 126 (1917).

(1). Var. **parvum** *Snowden*, var. nov. *Panicula* laxa vel contractiuscula, elliptico-ovata, elliptico-oblonga vel oblonga, 20–40 cm. longa, 5–15 cm. lata ; pedunculus erectus vel recurvus ; rami parte basali excepta graciles et flexuosi. *Spiculae sessiles* lanceolatae, breviter acutae, 4–5 mm. longae, 2–3 mm. latae, pilis albidis vel fulvis vel brunneis saepe dense pilosae ; gluma inferior fere omnino coriacea ; lemma superius mucronatum ; caryopsides maturae obviae vel infra glumam alteram vel utramque comprehensae, 3.5–4 mm. longae, 2.5–3.5 mm. latae. *Spiculae pedicellatae* persistentes.

BURMA : Mandalay ; Monywa, *Herb. Coll. Agric. Mandalay* 1252 (typus).

(2). Var. **fulvum** (*Hack.*) *Snowden*, comb. nov. *Andropogon Sorghum* subsp. *sativus* var. *fulvus* Hack. in DC. Monogr. Phan. 6, 512 (1889).

MADAGASCAR : Nossi-Bé, *Hildebrandt* 3219 (typus).

(3). Var. **jucundum** (*Busse et Pilger*) *Snowden*, comb. nov. *Andropogon Sorghum* var. *jucundus* Busse et Pilger in Engl. Bot. Jahrb. 32, 185 (1902).

TANGANYIKA : Ugogo ; Ilindi, *Busse* 273 (typus in Herb. Berol.).

(4). Var. **hirsutum** (*Busse et Pilger*) *Snowden*, comb. nov. *Andropogon Sorghum* var. *hirsutum* Busse et Pilger in Engl. Bot. Jahrb. 32, 185 (1901).

TANGANYIKA TERRITORY : Meatu, Ngungumavar, *Bauman* 14 (typus in Herb. Berol.).

(5). Var. **hians** *Stapf* in Prain, Fl. Trop. Afr. 9, 127 (1917).

INDIA : without precise locality, ex *Herb. Wight* 1670 (typus).

(6). Var. **nanum** *Snowden*, var. nov. ; a var. *hiante* *Stapf* differt, culmis brevioribus usque ad 2 m. altis plerumque dulcibus, spiculis sessilibus nonnihil minoribus angustioribus 4–4.5 mm. longis et

2-2.5 mm. latis, caryopsidibus magis compressis, regione nucellari pallido- vel atro-vinaceis.

INDIA : Bihar & Orissa ; Patna, *Alam 2* (typus).

(7). Var. **farinosum** *Snowden*, var. nov.; affine var. *hianti* Stapf. sed spiculis sessilibus paullo majoribus 4-5.5 mm. longis et 2.5-4 mm. latis, caryopsidibus maturis endospermio omnino plus minusve molli farinaceo praeditis differt.

PORTUGUESE EAST AFRICA : Massangulo, *Gomes Souza E.* (typus).

(8). Var. **mutabile** *Snowden*, var. nov.; a var. *hiantie* Stapf differt spiculis sessilibus majoribus 5-6 mm. longis et 2.5-3.5 mm. latis, lemmate superiore plerumque aristato vel nonnunquam mucronato, caryopsidibus paullo majoribus usque ad 4.5 mm. longis, spiculis pedicellatis saepe deciduis.

TANGANYIKA TERRITORY : Singida District, *Curry 19* (typus).

9. **S. gambicum** *Snowden*, sp. nov.; affine *S. guineënsi* Stapf, sed spiculis sessilibus minoribus saepe pilosis, gluma inferiore magis obscure bicarinata, caryopsidibus glumis multo longioribus, spiculis pedicellatis persistentibus minoribus differt.

Culmi validi, 3-6 m. alti, prope basin 2-4 cm. lati. *Folia* 15-20 ; laminae usque ad 1 m. longae et 10 cm. latae. *Panicula* laxa, elliptica vel elliptico-oblonga, 20-50 cm. longa, 5-20 cm. lata ; rami parte basali excepta graciles, saepe nutantes et subsecundi, prope basin plus minusve pilosi, superne tenuiter scabridi, inferiores usque ad 20 cm. longi. *Spiculae sessiles* anguste ellipticae, ellipticae vel elliptico-oblongae, breviter acutae, 4-5 (raro 5.5) mm. longae, 2-3.5 mm. latae, nonnihil strigoso-pilosae vel demum glabrescentes nitentes. *Glumae* aequales vel superior sub anthesi paullo longior, coriaceae ; inferior prope apicem obscure bicarinata. *Lemmata* hyalina, moderate vel dense ciliata ; superius mucronatum vel arista 6-15 mm. longa praeditum. *Caryopsides* maturae obviae, e glumis late hiantibus exsertae, 4-4.5 mm. longae, 3.25-3.75 mm. latae, dorso late ellipticae vel ovato-rotundae, compressae et applanatae vel plano-convexae, albidae vel flavae vel purpurascenti-cinereae, regione nucellari saepe fusco-colorata. *Spiculae pedicellatae* lineares vel lineari-subulatae, steriles, 3-4 mm. longae, maturae persistentes, pedicellis 2-2.5 mm. longis.

GAMBIA : *Dept. Agric. 11* (typus).

(1). Var. **gambicum** *Snowden*, var. nov. *Panicula* 20-40 cm. longa, 5-15 cm. lata ; rami sparsiusculi, 10-15 cm. longi. *Spiculae sessiles* plus minusve strigillosae ; lemma superius mucronatum vel breviter aristatum ; caryopsides plerumque plano-convexae, albidae, flavae, pallido- vel atro-purpurascenti-cinereae.

GAMBIA : *Dept. Agric. 11* (typus).

(2). Var. **celsum** Snowden, var. nov. *Panicula* 30–50 cm. longa, 10–20 cm. lata ; rami dense fasciculati, inferiores 12–20 cm. longi. *Spiculae sessiles* glabrescentes vel glabrae ; lemma superius arista 10–15 mm. longa praeditum ; caryopsides compressae et applanatae, albae sed regione nucellari atro-colorata.

SIERRA LEONE : Koinadugu District ; north of Kabala, *Glanville* 338 (typus).

10. **S. exsertum** Snowden, sp. nov.; affine *S. guineënsi* Stapf et *S. eleganti* (Koern.) Snowden, ab illo glumis caryopside biconvexa vel leviter compressa brevioribus et plus minusve arcte appressis, ab hoc spiculis sessilibus ellipticis, caryopsidibus convexioribus, spiculis pedicellatis plerumque deciduis differt.

Panicula laxa, elliptica vel oblonga, nonnunquam subumbellata, 30–55 cm. longa, 8–20 cm. lata ; rami inferne validi et suberecti, superne graciles, patuli et nutantes, inferiores 10–15 cm. longi vel paniculae fere aequilongi, prope basin pilosi, superne tenuiter scabridi. *Spiculae sessiles* ellipticae vel elliptico-oblongae, 4.5–6 mm. longae, 2.5–3.5 mm. latae, prope apicem et margines pilosiusculae vel demum glabrescentes. *Glumae* subaequales, coriaceae ; inferior supra medium plus minusve bicarinata, carinis dentibus minutis nonnunquam terminatis. *Lemmata* hyalina, moderate ciliata ; superius mucronatum vel arista usque ad 7 mm. vel ultra longa praeditum. *Caryopsides* maturae e glumis plus minus arcte appressis exsertae, 3.5–5.5 mm. longae, 3.5–4.5 mm. latae, dorso late ellipticae, elliptico-oblongae, vel rotundatae, albae vel flavidae, raro purpurascenti-brunneae vel rubido-brunneae sed tunc regione nucellari fusco-colorata. *Spiculae pedicellatae* lineares vel lineari-lanceolatae vel lineari-subulatae, 3–6 mm. longae, ♂ vel steriles, deciduae vel raro persistentes, pedicellis gracilibus 2–3 mm. longis.

NORTHERN NIGERIA : Ibadan, *Farquharson* Y (typus).

(1). Var. **exsertum** Snowden, var. nov. *Panicula* subumbellata (rhachi abbreviata) vel elliptica vel oblonga (rhachi elongata gracili). *Spiculae sessiles* 4.5–5 mm. longae ; lemma superius mucronatum ; caryopsides e glumis arcte appressis leviter exsertae, 3.5–4.5 mm. longae, 3–3.5 mm. latae, biconvexae, albae vel pallide flavae vel flavae. *Spiculae pedicellatae* maturae deciduae.

NORTHERN NIGERIA : Ibadan, *Farquharson* Y (typus).

(2). Var. **amplum** Snowden, var. nov.; a var. *exserto* Snowden differt paniculis robustioribus, spiculis sessilibus 5–6 mm. longis, lemmate superiore nonnunquam aristato, caryopsidibus 4.5–5.5 mm. longis 3.5–4.5 mm. latis nonnunquam inter glumas arcte comprehensis albidis vel flavis raro purpurascenti-brunneis vel rubido-brunneis sed tunc regione nucellari fusco-colorato.

NORTHERN NIGERIA : Sokoto, Emirate boundary to Gusau, *Sampson* (typus).

SUBSERIES iii. NERVOSA.

Spiculae sessiles et panicula plus minusve ut in subser. *Drummondii*; glumae vel saltem inferior tenuiter crustaceae vel chartaceae, fere omnino vel ad medium vel raro tantum apicem versus (cf. *S. Ankolib*) striato-nerves; caryopsides glumis breviores vel aequilongae, raro longiores (cf. *S. nervosum*), omnino inclusae vel plus minusve obviae; spiculae pedicellatae maturae persistentes.

11. *S. membranaceum* Chiov. in Monogr. Rapp. Colon. Rome, No. 19, Oct. 1912, pp. 23, 24, 47. *S. papyrascens* Stapf in Prain, Fl. Trop. Afr. 9, 134 (1917).

(1). Var. **Baldratianum** Chiov. in Monogr. Rapp. Colon. Rome, No. 19, Oct. 1912, p. 47. *S. papyrascens* var. *versiculare* Stapf in Prain, Fl. Trop. Afr. 9, 134.

ERITREA: Bogos; Cheren, *Baldrati* 1 (typus in Herb. Florent.).

(2). Var. **lateritium** (Stapf) Snowden, comb. nov. *Sorghum papyrascens* var. *lateritium* Stapf in Prain, Fl. Trop. Afr. 9, 134.

ANGLO-EGYPTIAN SUDAN: Sennar Province, ex *Rubber Exhibition, London, 1914* (typus).

(3). Var. **Ehrenbergianum** (Koern) Snowden, comb. nov. *Andropogon Sorghum* var. *Ehrenbergianus* Koern. apud Aschers. et Schweinf., in Mém. Inst. Egypt, 2, (Illustr. Fl. d'Egypt, 163: 1887).

EGYPT: near Assouan, *Ehrenberg* (typus in Herb. Berol.).

(4). Var. **firminus** Snowden, var. nov. *Panicula* laxa, elliptico-lanceolata vel elliptico-oblonga, 20–35 cm. longa, 8–15 cm. lata; rhachis abbreviata vel elongata et gracilis; rami nisi prope basin graciles et flexuosi, 10–20 cm. longi. *Spiculae sessiles* 7–8 mm. longae, 3–4 mm. latae; glumae tenues et chartaceae vel infra medium nonnihil subcoriaceae; lemma superius mucronatum; caryopsides late ellipticae vel elliptico-ovatae, 5–5.5 mm. longae, 3.5–4 mm. latae, glumis inclusae vel partim obviae, salmoneo-coloratae vel brunneae vel rubidae. *Spiculae pedicellatae* 5–6 mm. longae, plus minusve ferrugineae, pedicellis 2–4 mm. longis.

TANGANYIKA TERRITORY: Masasi, *Dept. Agric.* 327 (typus).

(5). Var. **tenue** Snowden, var. nov.; affine var. *firmiori* Snowden, sed spiculis sessilibus 5.5–8 mm. longis usque ad 3.5 mm. latis, glumis tenuibus et omnino papyraceis, lemmate superiore arista 7–14 mm. longa plerumque praedito, caryopsidibus anguste-ellipticis 4–5.5 mm. longis 2.5–3 mm. latis brunneis vel rubidis vel rubidonigris, spiculis pedicellatis 5–8 mm. longis ♂ vel nonnunquam ♀, pedicellis 2–3.5 mm. longis differt.

CHINA: Manchuria, ex *Japanese-British Exhibition, 1910*, X (typus).

(6). Var. **parvigranum** Snowden, var. nov.; a var. *firmitiori* Snowden differt culmis dulcibus et succosis, spiculis sessilibus 6–7 mm. longis usque ad 3 mm. latis, lemmate superiore mucronato, caryopsidibus parvis obovato-ellipticis 3·5–4 mm. longis 2·5–3 mm. latis flavidis vel brunneo-olivaceis, spiculis pedicellatis 5–6 mm. longis ♂ vel sterilibus, pedicellis 2–3 mm. longis.

SOUTH AFRICA: Western Transvaal, ex *Dept. Agric. Pretoria, Div. Bot.* 27 (typus).

12. **S. basutorum** Snowden, sp. nov.; affine *S. membranaceo* Chiov. et *S. caffrorum* Beauv., ab illo spiculis sessilibus maturis plus hiantibus, gluma superiore magis coriacea, caryopsidibus maturis magis obviis glumis aequilongis, ab hoc spiculis sessilibus oblongis vel elliptico-oblongis longioribus, gluma inferiore tenui et papyracea, lemmate superiore plerumque aristato differt.

Culmi validi, paniculam versus 1 cm. lati; basis et folia ignota. *Panicula* contracta et densiuscula, oblonga, circiter 20–30 cm. longa et 5–10 cm. lata; rami suberecti, prope basin validi, ceterum magis flexuosi, basi et axillis tomentosi vel villosi, superne scabridi, inferior 5–10 cm. longi. *Spiculae sessiles* oblongae vel elliptico-oblongae, subacutae, 6–7 mm. longae, 2·5–4 mm. latae, primo appresse pilosae, tandem glabrescentes. *Glumae* aequales; inferior tenuis et papyracea, primo dorso applanata, ad medium tenuiter striato-nervis, apicem versus anguste bicarinata; superior tenuiter coriacea. *Lemmata* hyalina, moderate vel dense ciliata; superius mucronatum vel arista usque ad 12 mm. longa saepe praeditum. *Caryopsides* maturae inter glumas appressas plus minusve aequilongas valde obviae, dorso late ellipticae vel obovato-ellipticae, 5–5·5 mm. longae, 4–4·5 mm. latae, biconvexae vel leviter compressae, albidae, eburneo-flavae, ferrugineae vel rubrae. *Spiculae pedicellatae* linearilanceolatae vel subulatae, 5–6 mm. longae, plerumque ♂, maturae persistentes, pedicellis 1–2 mm. longis.

SOUTH AFRICA: Basutoland; Leribe, *Dieterlen* 641a (typus).

13. **S. nervosum** Bess. ex Schult in Roem et Schult. Syst. Veg. 2, Mant. 669 (1827).

(1). Var. **nervosum** (Hack.) Snowden, comb. nov. *Andropogon Sorghum* subsp. *sativus* var. *nervosus* Hack. in DC. Monogr. Phan. 6, 513 (1889).

CHINA: Woopung (typus in Herb. Haun.).

(2). Var. **flexibile** Snowden, var. nov. *Panicula* nisi prope basin laxa, corymbiformis vel subumbelliformis, 25–40 cm. longa, 10–20 cm. lata; rhachi abbreviata vel elongata et tunc superne gracillima; rami suberecti, validiusculi, basin versus appressi, ceterum graciles et patentés, inferiores paniculam aequantes vel dimidium ejus superantes. *Spiculae sessiles* ellipticae vel elliptico-oblongae, acutae vel subobtusae, 4–5 mm. longae, 2·25–3·5 mm.

latae, fere glabrae ; gluma inferior papyracea, valde striato-nervis ; superior coriacea ; lemma superius mucronatum vel aristatum ; caryopsides maturae glumis aequilongae vel paullo longiores, valde obviae, dorso ellipticae vel obovato-ellipticae, 3·5–5·5 mm. longae, 2·5–4 mm. latae, biconvexae vel plano-convexae, albidae, eburneo-flavae, brunneae vel rubrae. *Spiculae pedicellatae* 3–6 mm. longae, ♂ vel steriles, persistentes, pedicellis 1–2·5 mm. longis.

CHINA : Manchuria, ex *Japanese-British Exhibition*, 1910, H (typus).

14. **S. melaleucum** Stapf in Prain, Fl. Trop. Afr. 9, 134 (1917).

ANGLO-EGYPTIAN SUDAN : without precise locality, ex *Rubber Exhibition*, London, 1914 (typus).

15. **S. ankolib** Stapf in Prain, Fl. Trop. Afr. 9, 135 (1917).

(1). Var. **ankolib** (Hack.) Snowden, comb. nov. *Andropogon Sorghum* subsp. *sativus* var. *ankolib* Hack. in DC. Monogr. Phan. 6, 519 (1889).

ANGLO-EGYPTIAN SUDAN : Gallabat, *Schweinfurth* 1530 (typus).

(2). Var. **glaberrimum** (Hack.) Snowden, comb. nov. *Andropogon Sorghum* subsp. *sativus* var. *glaberrimum* Hack., l.c. 512.

ANGLO-EGYPTIAN SUDAN : Sennar, *Wurtemberg* (typus in Herb. Vindob.).

16. **S. splendidum** (Hack.) Snowden, stat. nov.; *Andropogon Sorghum* subsp. *sativus* var. *splendidus* Hack., in DC. Monogr. Phan. 6, 510 (1889). Affine *S. membranaceo* Chiov. et *S. Dochna* (Forsk.) Snowden, ab illo panicula glabriore, glumis spicularum sessilium durioribus et magis crustaceis, pedicellis longioribus gracilioribus, caryopsidibus plerumque inclusis, ab hoc spiculis sessilibus majoribus ad medium vel infra medium latioribus, caryopsidibus plerumque inclusis glumis brevioribus, pedicellis gracilioribus longioribus differt.

Culmi robusti, usque ad 2 m. vel ultra alti, prope basin 1–2 cm. lati. *Folia* numerosa ; laminae summae usque ad 50 cm. longae, 2–6 cm. latae. *Panicula* laxa, lanceolata vel elliptico-lanceolata vel elliptico-oblonga, usque ad 40 cm. longa et 15 cm. lata ; rami suberecti, prope basin validiusculi, ceterum graciles, flexuosi et patentes, ut ramuli scabridi, ceterum fere glabri, inferiores 10–25 cm. longi. *Spiculae sessiles* elliptico-lanceolatae, oblongo-lanceolatae, elliptico-oblongae vel ellipticae, acutae vel acuminatae, 6–11 mm. longae, 2·5–4·5 mm. latae, glabrae vel sparse pilosae, tandem nitentes. *Glumae* aequales, tenuiter crustaceae, apicibus nonnihil papyraceis ; inferior supra medium tenuiter striato-nervis, triente superiore bicarinata, carinis scabridis ; superior supra medium carinata. *Lemmata* hyalina, moderate ciliata ; superius arista 12–18 mm. longa praeditum vel raro arista multo redacta et inter glumas

inclusa. *Caryopsides* maturae inter glumas inclusae vel fere inclusae, 4-5 mm. longae, 2.5-3.5 mm. latae, dorso obovatae vel obovato-ellipticae, biconvexae vel prope basin leviter compressae, eburneo-flavae, flavae vel rufae. *Spiculae pedicellatae* lineari-lanceolatae vel elliptico-lanceolatae, 5-10 mm. longae vel saepe multo redactae, steriles vel raro ♂, maturae persistentes, pedicellis 1.5-4 mm. longis.

HAWAIIAN ISLANDS : Oahu Island ; Honolulu, *Wawra* (typus).

(1). Var. **splendidum** (Hack.) Snowden, comb. nov. *Andropogon Sorghum* subsp. *sativus* var. *splendidus* Hack. l.c.

HAWAIIAN ISLANDS : Oahu Island ; Honolulu, *Wawra* (typus in Herb. Vindob.).

(2). Var. **magnum** Snowden, var. nov. *Spiculae sessiles* elliptico-lanceolatae vel elliptico-oblongae, 8-11 mm. longae, 3.5-4.5 mm. latae ; lemma superius aristatum ; caryopsides maturae inter glumas inclusae, dorso obovatae, 5-5.5 mm. longae, 3.5-4 mm. latae.

SIAM : Seiracha, introduced from Rayong, *Collins* 1402 (typus).

(3). Var. **ellipticum** Snowden, var. nov. ; affine var. *magno* Snowden, sed spiculis sessilibus brevioribus ellipticis vel elliptico-oblongis 7.5-8 mm. longis, arista lemmatis superioris saepe multo redacta et inter glumas nonnunquam inclusa differt.

PHILIPPINE ISLANDS : Central Luzon, *Loher* 5167 ! Without precise locality, *Loher* 7126 (typus).

SUBSERIES iv. BICOLORIA.

Panicula plus minus ut in subser. *Drummondii* ; spiculae sessiles obovatae, obovato-ellipticae vel obovato-oblongae, sub anthesi raro ellipticae vel elliptico-oblongae sed tunc maturae leviter obovato-ellipticae vel obovato-oblongae ; glumae coriaceae, nisi prope apicem obscure nervosae vel raro crustaceae et nonnihil striato-nerves (cf. *S. Dochna*) ; caryopsides maturae plerumque plus minusve obviae sed tunc inter glumas arcte comprehensae, raro inclusae ; spiculae pedicellatae persistentes (eis *S. notabilis* exceptis) ; pedicelli plerumque breves, 0.5-2 mm. longi (sed. cf. *S. Dochna* et *S. notabile*).

17. *S. dochna* (Forsk.) Snowden comb. nov. *Holcus dochna* Forsk. Fl. Aegypt-Arab. 174 (1775). *Andropogon Sorghum* var. *saccharatus* Koern. in Handb. Getreideb. 1, 310 : 1873 (pro parte).*

EGYPT : (Rosetta) Cultivated, *Forsskaal* (typus 108 in Herb. Forsk., in Herb. Mus. Haun.).

* The species which Linnaeus described under *Holcus* will be discussed elsewhere, but it is necessary to mention that in the second edition of his Sp. Pl. 1484 (1763) Linnaeus completely changed the diagnosis of his *Holcus saccharatus* and it is deemed inadvisable to use the name here (see Stapf in Kew Bull. 1919, 25).

(1). Var. **pulchrum** (Burkill) Snowden, comb. nov. *Andropogon Sorghum* var. *pulcher* Burkill ex Benson et Subba Rao, Madras Dept. Agric. Bull. No. 55, 67 : 1906 (pro parte).

BURMA : Sagaing, ex *Herb. Rep. Econ. Prod. India* 11793a (typus).

(2). Var. **atrum** Snowden, var. nov. *Panicula* laxa vel contractiuscula et densa, elliptica, elliptico-oblonga vel oblonga, 15–30 cm. longa, 5–12 cm. lata ; pedunculus erectus vel recurvus ; rami suberecti, nisi prope basin graciles, inferiores 5–10 cm. longae. *Spiculae* sessiles ellipticae vel aliquantulum obovato-ellipticae, subobtusae vel acutae, 4.5–5.5 mm. longae, 2–3.5 mm. latae, demum glabrescentes, plerumque brunnea evel atro-coloratae ; glumae sub anthesi nonnihil papyraceae, tandem tenuiter crustaceae ; gluma inferior triente superiore tenuiter striato-nervis ; lemma superius plerumque arista longa praeditum. *Caryopsides* inter glumas appressas fere inclusae vel maturae apice leviter obviae, tenuiter obovato-ellipticae vel obovato-oblongae, 4–4.5 mm. longae, 2.5–3 mm. latae, biconvexae, albidae vel brunneae. *Spiculae pedicellatae* 3–5 mm. longae, persistentes, pedicellis brevibus 0.5–1.5 mm. longis.

BURMA : Sagaing, ex *Herb. Rep. Econ. Prod. India* 11795a (typus).

(3). Var. **burmanicum** (Burkill) Snowden, comb. nov. *Andropogon Sorghum* var. *burmanicus* Burkill ex Benson et Subba Rao, l.c.

BURMA : Sagaing, *Herb. Rep. Econ. Prod. India* 11792a (typus).

(4). Var. **corymbosum** (Hack.) Snowden, comb. nov. *Andropogon Sorghum* subsp. *sativus* var. *corymbosus* Hack. in DC. Monogr. Phan. 6, 513 (1889).

JAMAICA : cultivated in the Botanic Gardens 1857, ex *Herb. A. Braun* (typus in *Herb. Berol.*).

(5). Var. **technicum** (Koern.) Snowden, comb. nov. *Andropogon Sorghum* var. *technicus* Koern. in Syst. Uebers. 20 (1873) ; Handb. Getreideb. 1, 308 (1885).

(6). Var. **obovatum** (Hack.) Snowden, comb. nov. *Andropogon Sorghum* subsp. *sativus* var. *obovatus* Hack. in DC. Monogr. Phan. 6, 514 : 1889 (pro parte, excl. subv. *niger*). *Andropogon Sorghum* var. *Dochna* Christensen in Dansk. Bot. Arkiv. 4, No. 3, 29 (1922).

(7). Var. **irungu** (Burkill) Snowden, comb. nov. *Andropogon Sorghum* var. *irungu* Burkill ex Benson et Subba Rao, Madras Dept. Agric. Bull. No. 55, 67 (1906)

INDIA : Madras ; Madura, ex *Herb. Rep. Econ. Prod. India* 15616 (typus).

(8). Var. **formosum** Snowden, var. nov. *Panicula* laxa, elliptica vel oblonga, 20–45 cm. longa, 5–10 cm. lata ; rami suberecti, nisi prope basin graciles et flexuosi, inferiores 10–20 cm. longi. *Spiculae*

sessiles ellipticae vel nonnihil obovato-ellipticae, subacutae, 4·5-5·5 mm. longae, 2·5-3 mm. latae, apicibus saepe perpetuo pilosae; glumae tenuiter coriaceae vel crustaceae; gluma inferior triente superiore obscure striato-nervis; lemma superius mucronatum vel aristatum. Caryopsides maturae omnino inclusae vel apice leviter obviae sed glumas arcte appressas haud superantes, ambitu spiculis sessilibus similes, biconvexae, saepe brunneae vel rubellae. Spiculae pedicellatae persistentes, pedicellis subgracilibus 1-2 mm. longis.

EGYPT: Behera Province; Acricha, *Dudgeon* (typus).

(9). Var. **Wightii** (*Hack.*) *Snowden*, comb. nov. *Andropogon Sorghum* subsp. *sativus* var. *Wightii* *Hack.* in DC. *Mongr. Phan.* 6, 511 (1889).

INDIA: Without precise locality, *Herb. Wight propr.* 185 (typus in *Herb. Berol.*).

(10). Var. **melliferum** *Snowden* var. nov.; affine var. *formoso* *Snowden*, a quo recedit spiculis sessilibus aliquantum latioribus 3-3·5 mm. latis demum glabrescentibus vel nitentibus plerumque nigris, caryopside matura inter glumas appressas subocculta apice tantum superneque lateribus obvia 4-5 mm. longa 3-3·5 mm. lata albida flavida brunnea vel rubida, pedicellis validiusculis 0·5-1·5 mm. longis.

INDIA: Madras; Tinnevely, etc. *Anstead* 3 (typus).

18. **S. bicolor** (*Linn.*) *Moench*, *Meth.* Pl. 207 (1794).

(1). Var. **bicolor** (*Pers.*) *Snowden*, comb. nov. *Holcus bicolor* *Linn. Mant.* 301 (1771); *Sorghum vulgare* var. *bicolor* *Pers. Syn.* 101 (1805).

(2). Var. **Arduini** (*Koern.*) *Snowden*, comb. nov. *Holcus Arduini* *Gmel. Syst. Nat.* 2, 174 (1791); *Andropogon Sorghum* var. *Arduini* *Koern., Handb. Getreideb.* 1, 312: 1885 (pro parte).

(3). Var. **picigutta** *Snowden* var. nov. *Panicula laxa* vel contractiuscula et densa, oblonga vel obovata, 12-25 cm. longa, 5-10 cm. lata; pedunculus nonnunquam recurvus; rami suberecti, inferne validiusculi, superne graciles et nonnihil patentes, inferiores usque ad 10 cm. longi. *Spiculae sessiles* obovatae vel obovato-rotundae, apice lato nonnihil depresso, 4·5-5·5 mm. longae, 3-4 mm. latae, demum nigro-brunneae vel nigrae, nisi prope apicem glabrae et nitentes; lemma superius plerumque aristatum sed arista nonnunquam redacta; arista cum lemmate decidua. *Caryopsides* maturae omnino inclusae vel apice inter glumas arcte appressas leviter obviae, dorso ellipticae vel obovato-ellipticae vel subrotundae, biconvexae, flavido-brunneae, brunneae vel rubrae. *Spiculae pedicellatae* plerumque multo redactae, tandem e pedicellis gracilibus saepe defractae.

BURMA : Rangoon, *McClelland* (typus).

(4). Var. **Charisianum** (*Busse et Pilger*) *Snowden*, comb. nov. *Andropogon Sorghum* var. *Charisianus* Busse et Pilger in Engl. Bot. Jahrb. **32**, 187 : 1902 (pro parte).

TANGANYIKA TERRITORY : Usambara, *Holst* (typus in Herb. Berol.).

(5). Var. **subglobosum** (*Hack.*) *Snowden*, comb. nov. *Andropogon Sorghum* subsp. *sativus* var. *subglobosus* Hack. in DC. Monogr. Phan. **6**, 515 (1889).

HAWAIIAN ISLANDS : Honolulu, in garden, *Wawra* (typus in Herb. Vindob.).

19. S. miliiforme (*Hack.*) *Snowden*, stat. nov. *Andropogon Sorghum* subsp. *sativus* var. *miliiformis* Hack. in DC. Monogr. Phan. **6**, 518 (1889). Affine *S. bicolori* Moench et *S. caudato* Stapf, ab illo spiculis sessilibus multo minoribus, longitudine latitudinem fere aequante, lemmate superiore mucronato vel breviter aristato (arista usque ad 3 mm. longa), panicula pilosiore, ab hoc spiculis sessilibus magis obovato-rotundis, gluma inferiore apice depressa, caryopsidibus subglobosis differt.

INDIA : Sikkim ; *Hooker & Thomson* (typus).

(1). Var. **miliiforme** (*Hack.*) *Snowden*, comb. nov. *Andropogon Sorghum* subsp. *sativus* var. *miliiformis* Hack., l.c.

INDIA : Sikkim ; *Hooker & Thomson* (typus).

(2). Var. **rotundulum** *Snowden*, var. nov.; affine var. *miliiformi* (*Hack.*) *Snowden*, sed panicula magis contracta et nonnihil densa anguste oblonga vel lanceolato-oblonga 4–7 cm. lata, rhachi plus minusve abscondita, ramis brevioribus et rigidioribus inferioribus plerumque 5 cm. haud attingentibus differt.

INDIA : Bihar & Orissa ; Bhagalpur, *Alam* 9 (typus).

(3). Var. **sikkimense** *Snowden*, var. nov.; affine var. *miliiforme* (*Hack.*) *Snowden*, sed panicula majore ovata vel elliptico-ovata 30–35 cm. longa 15–20 cm. lata, ramis inferioribus 10–20 cm. longis, caryopsidibus majoribus plerumque 4 mm. longis et latis differt.

INDIA : Sikkim ; Tukvar, *Gamble* 3354a (typus).

20. S. simulans *Snowden*, sp. nov.; affine *S. bicolori* Moench et *S. caudato* Stapf, ab illo gluma inferiore spicularum sessilium obscure bicarinata apice glabra, lemmate superiore mucronato, caryopsidibus plano-convexis acutiusculis multo obviis, ab hoc spiculis sessilibus magis obovatis, gluma inferiore apice depressa, caryopsidibus inter glumas subaequales arcte comprehensis differt.

Culmi validi, usque ad 3 m. alti et prope basin 2 cm. lati, plerum-

que dulci et succosi. *Folia* 16 vel ultra ; laminae usque ad 80 cm. longae et 8 cm. latae. *Panicula* laxa vel contractiuscula, ovata vel elliptica, nonnunquam corymbiformis, 15–30 cm. longa, 10–15 cm. lata ; pedunculus erectus vel raro recurvus ; rhachis abbreviata vel raro elongata et gracilis ; rami nisi prope basin graciles et flexuosi, prope basin et in axillis ramificationum tomentosi vel villosi, ceterum fere glabri lavesque, superiores plerumque longiores, dimidium paniculae aequantes vel superantes. *Spiculae sessiles* obovato-oblongae vel obovatae, apice longiusculo subacuto vel obtuso plus minusve depresso, 4–5 mm. longae, sub anthesi 2·5–3 mm. latae, maturae obovato-rotundae et 3·5–4 mm. latae. *Glumae* aequales vel superior sub anthesi inferiore paullo longior, coriaceae ; inferior ecarinata vel prope apicem obscure et breviter bicarinata. *Lemmata* hyalina, sparse vel moderate ciliata ; superius mucrone 0·5–2 mm. longo praeditum. *Caryopsides* maturae dimidio superiore inter glumas subaequales arcte appressas obviae, dorso ellipticae, apice acutiusculae, plano-convexae, 4–4·5 mm. longae, 3–3·5 mm. latae, flavido-brunneae vel brunneae, rubrae vel nigro-rubrae. *Spiculae pedicellatae* lineari-lanceolatae, 3–4·5 mm. longae, steriles, persistentes, pedicellis 1–2 mm. longis.

NYASALAND : southern area, *Barker* 4/1927 (typus).

21. *S. elegans* (Koern.) Snowden, stat. nov. *Andropogon Sorghum* var. *elegans* Koern. in Baumann, Usambara, 318 (1891) ; K. Schum. in Engl. Pfl. Ost-Afr. B.40 (1895) ; affine *S. bicolori* Moench et *S. simulanti* Snowden, caryopside multum compressa plerumque valde magna et glumis plerumque multo longiore, apice glumae inferioris non distincte depresso, ramis paniculae gracillimis, etiam a *S. bicolori* Moench spiculis sessilibus plerumque muticis differt.

TANGANYIKA TERRITORY : North Usegua, *Baumann* 1a (typus in Herb. Berol.).

(1). Var. ***elegans* (Koern.) Snowden**, comb. nov. *Andropogon Sorghum* var. *elegans* Koern. l.c.

(2). Var. ***Schumannii* (Busse et Pilger) Snowden**, comb. nov. *Andropogon Sorghum* var. *Schumannii* Busse et Pilger in Engl. Bot. Jahrb. 32, 186 : 1902 (pro parte).

TANGANYIKA TERRITORY : Uluguru ; Kiroka, *Busse* 1161 (typus in Herb. Berol.).

(3). Var. ***togoënsis* Snowden**, var. nov. ; a var. *elegante* (Koern.) Snowden differt rhachi paniculae plerumque continua, caryopsidibus dorso late ovatis vel orbicularibus albidis flavidis, cinereis vel rubris, scutello longiore duas partes caryopsides aequante.

DAHOMEY : (Togoland), *Kersting* (Kabure-sortes 15, typus in Herb. Berol.).

(4). Var. **Ziegleri** (*Busse et Pilger*) *Snowden*, comb. nov. *Andropogon Sorghum* var. *Ziegleri* Busse et Pilger in Engl. Bot. Jahrb. **32**, 186 (1902).

TANGANYIKA TERRITORY : Usagara ; Sedia, *Busse* 1237 (typus in Herb. Berol.).

(5). Var. **Holstii** (*Busse et Pilger*) *Snowden*, var. nov.; *Andropogon Sorghum* var. *Charisianus* subv. *Holstii* Busse et Pilger in Engl. Bot. Jahrb. **32**, 187 : 1902 (pro parte).—affine var. *Ziegleri* (*Busse et Pilger*) *Snowden*, sed ramulis et spiculis pedicellatis et apice spicularum sessilium primo rubello-tinctis, caryopsidibus salmoneo-coloratis vel rufis vel ferrugineis differt.

TANGANYIKA TERRITORY : Usambara ; *Holst* (typus in Herb. Berol.).

Vern. name : *Kikaratta*.

(6). Var. **Baumannii** (*Koern.*) *Snowden*, comb. nov. *Andropogon Sorghum* var. *Baumannii* Koern. in Baumann, Usambara, 318 (1891).

TANGANYIKA TERRITORY : North Usegua, *Baumann* 28 (typus in Herb. Berol.).

22. S. notabile *Snowden*, sp. nov.; affine *S. guineënsi* Stapf et *S. eleganti* (*Koern.*) *Snowden*, ab illo spiculis sessilibus maturis obovato-ellipticis vel obovato-oblongis, caryopside inter glumas arcte comprehensa glumis plerumque multo longiore, ab hoc spiculis sessilibus minus obovatis, spiculis pedicellatis plerumque deciduis, pedicellis longioribus differt.

Culmi validi, 3–4 m. alti, prope basin 2–4 cm. lati. *Folia* 20–30 ; laminae usque 80 cm. vel ultra longae et 7–5 cm. latae. *Panicula* laxa, elliptico-oblonga, lanceolato-oblonga, oblonga vel obovato-elliptico, plerumque umbellata, 20–50 cm. longa, 5–12 cm. lata ; rhachis continua et superne gracilis vel valde abbreviata, nisi prope nodos sparse pilosa vel fere glabra ; rami suberecti, prope basin validiusculi, ceterum graciles vel gracillimi et flexuosi, pilis paucis prope basin et in axillis ramulorum exceptis fere glabri, superne plus minusve scabridi, inferiores 10–20 cm. longi vel paniculae aequilongi, prope basin per 2–10 (raro 20) cm. saepe espiculati. *Spiculae* sessiles ellipticae vel elliptico-oblongae vel leviter obovato-ellipticae vel anguste obovato-oblongae, acutae, 4–5.5 mm. longae, sub anthesi 2–3 mm. latae, maturae magis obovato-ellipticae vel obovato-oblongae et usque ad 4 mm. latae, glabrae vel fere glabrae, tandem nitentes et saepe nigro-brunneae vel nigrae ; callus sparse barbatus vel glaber. *Glumae* aequales, coriaceae ; inferior tertia parte superiore obscure bicarinata. *Lemmata* hyalina, tenuiter vel moderate ciliata ; superius mucronatum. *Caryopsides* maturae glumas arcte appressas valde superantes vel raro fere aequantes, 5–6.5 mm. longae, 3–4.5 mm. latae, dorso ellipticae, obovato-ellipticae vel obovatae, plano-convexae, plerumque valde compressae,

albidae, cinereae vel rubidae, regione nucellari fusco-colorata. *Spiculae pedicellatae* lineari-lanceolatae, 3–5 mm. longae, steriles, deciduae vel maturae raro persistentes, pedicellis gracilibus, 1–3 mm. longis.

NORTHERN NIGERIA : Zaria, *Glendon Hill* K (typus).

(1). Var. **notabile** *Snowden*, var. nov. *Panicula* laxa, obovato-elliptica, saepe umbellata, 30–45 cm. longa, 8–12 cm. lata; rhachis plerumque abbreviata, 8–16 cm. longa; rami suberecti, prope basin appressi et validiusculi, 20–35 cm. longi, saepe prope basin per 10–20 cm. simplices et espiculati. *Spiculae sessiles* 4–5 mm. longae, 2–3 mm. latae; caryopsides maturae glumis multo longiores, 5–6 mm. longae, 3·5–4 mm. latae, dorso ellipticae, apicem et basin versus angustatae, plano-convexae, valde compressae, rubidae. *Spiculae pedicellatae* maturae deciduae.

NORTHERN NIGERIA : Zaria, *Glendon Hill* K (typus).

(2). Var. **planogranum** *Snowden*, var. nov.; a var. *notabili* *Snowden* differt panicula elliptica lanceolato-oblonga vel oblonga 25–35 cm. longa, rhachi plerumque continua, ramis inferioribus 10–18 cm. longis prope basin per 3–8 cm. espiculatis, spiculis sessilibus usque ad 3·5 mm. latis, caryopsidibus 5–6·5 mm. longis 3–3·5 mm. latis albidis vel cinereis spiculis pedicellatis maturis persistentibus.

ANGLO-EGYPTIAN SUDAN. Bahr El Ghazal, *Punter* 39 (typus).

(3). Var. **nigrescens** *Snowden*, var. nov.; affine var. *plano-grano* *Snowden*, sed spiculis sessilibus paullo longioribus 4·5–5·5 mm. longis, caryopside glumis subaequali vel paullo longiore dorso obovata leviter compressa pallide rubra vel atro-rubra, spiculis pedicellatis maturis deciduis differt.

ANGLO-EGYPTIAN SUDAN : Nuba Mountains, *Punter* 91 (typus).

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Spiculae sessiles ovatae, ellipticae, elliptico-oblongae, obovato-ellipticae vel obovato-oblongae, sub anthesi longitudine latitudinem saepe haud multo superante, maturae apertae trientem usque dimidium caryopsidis exhibentes; caryopsides glumis plus minusve appressis aequilongae vel plerumque multo longiores; panicula contracta et densa, vel compacta, nonnunquam laxior sed tunc rhachi ramis et ramulis pilosis vel villosis; pedicelli breves, plerumque 0·5–2 mm. longi (sed cf. *S. coriaceum* *Snowden* et *S. caudatum* Stapf).

23. **S. coriaceum** *Snowden*, sp. nov.; a *S. conspicuo* *Snowden* et *S. Roxburghii* Stapf spiculis sessilibus late ellipticis, caryopside biconvexa vel planoconvexa glumis longiore, panicula saepe densissima differt, a *S. caffrorum* Beauv. spiculis sessilibus saepe longi-

oribus ellipticis, glumis valde coriaceis, lemmate superiore plerumque longe aristato, caryopside inter glumas minus arcte comprehensa differt.

Culmi validi, 2-3.5 m. alti, prope basin 2-3 cm. lati, insulsi vel raro dulces. *Folia* numerosa; laminae 0.6-1 m. longae, 8-12 cm. latae. *Panicula* densissima et cylindrica vel minus densa et ambitu oblonga vel elliptico-oblonga, vel raro laxa et nonnunquam subumbellata, 15-40 cm. longa, 5-12 (raro 20) cm. lata; rhachis continua vel raro abbreviata, prope basin et nodos dense villosi; rami prope basin validi et suberecti, ceterum graciliores et flexuosi, appressi vel tandem patentes, prope basin et axillis ramulorum villosi, ut ramuli superne scabridi, inferiores 5-15 cm. longi vel paniculae aequilongi. *Spiculae sessiles* late ellipticae (raro elliptico-rotundae), acutae vel subobtusae, 4-6 (raro 6.5) mm. longae, sub anthesi 2.5-3.5 mm. latae, maturae tandem elliptico-ovatae et 3.5-4.5 mm. latae, strigoso-hirsutae vel demum dorso glumarum glabrescentes; callus dense barbatus. *Glumae* aequales, crassae et coriaceae; inferior breviter et plerumque distincte bicarinata, apice nonnunquam distincte tridentata. *Lemmata* hyalina, moderate vel dense ciliata; superius plerumque arista 9-12 mm. longa praeditum vel nonnunquam mucronatum. *Caryopsides* maturae glumis longiores, valde obviae et inter glumas nonnunquam obliquiter versae, 4.5-6 mm. longae, 4-4.5 mm. latae, dorso ovatae, late ellipticae vel orbiculares, biconvexae vel leviter compressae, albidae, flavidae, brunneae vel rubidae, regione nucellari nonnunquam fusco-colorata. *Spiculae pedicellatae* lineari-lanceolatae vel elliptico-lanceolatae, 4-5 mm. longae, plerumque steriles, maturae persistentes (nisi in var. *tanganikae* Snowden), pedicellis 1.5-2.5 mm. longis, dense ciliatis.

NORTHERN RHODESIA: Mumbwa, cultivated at Mazabuka, Moore 63/1931 (typus).

(1). Var. **coriaceum** Snowden, var. nov. *Panicula* (saltem sub anthesi) contracta et densa, elliptica vel oblonga, nonnunquam cylindrica, 20-40 cm. longa, 5-12 cm. lata; rhachis continua, valida; rami suberecti, prope basin validi et rigidi, ceterum graciliores et flexuosi, inferiores usque ad 10 (raro 15) cm. longi, prope basin divisi. *Spiculae sessiles* late ellipticae, 4.5-5.5 mm. longae, maturae usque ad 4.5 mm. latae; gluma inferiore distincte bicarinata et apice plus minusve tridentata; lemma superius aristatum vel nonnunquam mucronatum; caryopsides maturae glumis appressis vel leviter involutis longiores, 4.5-5.5 mm. longae, 3-4.5 mm. latae, dorso late ellipticae vel orbiculares, biconvexae, albidae, flavidae, rubidae vel brunneae. *Spiculae pedicellatae* maturae persistentes.

NORTHERN RHODESIA: Mumbwa, cultivated at Mazabuka, Moore 63/1931 (typus).

(2). Var. **brevigluma** Snowden, var. nov.; affine var *coriaceo* Snowden, sed panicula plus minusve cylindrica, spiculis sessilibus

brevioribus late ellipticis vel elliptico-rotundis 4-4.5 mm. longis differt.

NORTHERN RHODESIA : Mazabuka, *Moore* 36/1931 (typus).

(3). Var. **subinvolutum** *Snowden*, var. nov., a var. *coriaceo* *Snowden* differt spiculis paullo majoribus, 5-6 (raro 6.5) mm. longis, gluma inferiore ecarinata vel obscure bicarinata et apice haud distincte 3-dentata, caryopside matura inter glumas plus minusve involutas saepe obliquiter versa.

NORTHERN RHODESIA : Mazabuka, *Moore* 39/1931 (typus).

(4). Var. **lualabicum** *Snowden*, var. nov. *Panicula* contracta, densa vel laxiuscula, lanceolato-oblonga vel elliptico-oblonga vel oblonga, 15-30 cm. longa, 5-10 cm. lata ; rhachis continua vel raro brevis ; rami prope basin validiusculi, ceterum graciliores et flexuosi, 5-15 cm. longi. *Spiculae sessiles* ellipticae, 4.5-5 mm. longae, maturae usque ad 3.5 mm. latae ; gluma inferior distincte bicarinata et apice plus minusve 3-dentata ; lemma superius plerumque aristatum : caryopsides maturae inter glumas nonnihil breviores saepe obliquiter versae, 4-5 mm. longae, 3-4 mm. latae, eburneo-flavae, vel raro brunneae vel rubrae. *Spiculae pedicellatae* maturae persistentes.

BELGIAN CONGO : Lualaba, Yadotville—Kamatanda, *Vermeiren* 2 (typus).

(5). Var. **tanganyikae** *Snowden*, var. nov.; affine var. *coriaceo* *Snowden*, a quo rhachi paniculae nonnunquam abbreviata, gluma inferiore spiculae sessilis obscure vel distincte bicarinata, caryopsidibus paullo minoribus 4-5 mm. longis 3-5-4 mm. latis, spiculis pedicellatis maturis plerumque deciduis differt.

TANGANYIKA TERRITORY : Mwanza District, *Dept. Agric.* 116 (typus).

(6). Var. **umbelliforme** *Snowden*, var. nov. *Panicula* laxa, plus minusve umbellata, 25-35 cm. longa, 8-20 cm. lata ; rhachis fere obsoleta vel brevissima ; rami basi excepta graciles et patentes, 10-20 cm. longi vel paniculae fere aequilongi. *Spiculae sessiles* 4.5-5.5 mm. longae, maturae usque ad 4 mm. latae ; gluma inferior obscure bicarinata et apice non distincte 3-dentata ; lemma superius mucronatum vel arista brevi praeditum ; caryopsides maturae inter glumas breviores saepe obliquiter versae, dorso ovatae vel late ellipticae vel orbiculares, albidae, flavidae vel rubidae. *Spiculae pedicellatae* maturae persistentes.

NORTHERN RHODESIA : Mazabuka, *Moore* 52/1929 (typus).

24. ***Sorghum caffrorum*** *Beauv.* *Agrost.* 131, 178 (1812) ; *Stapf* in *Prain Fl. Trop. Afr.* 9, 130 (1917).

(1). Var. **albofuscum** (Koern.) Snowden, comb. nov. *Andropogon Sorghum* var. *albofuscus* Koern. in Baumann, Massailand, 295 (1894).

TANGANYIKA TERRITORY : Karagwe ; West Usui, Baumann 13 (typus in Herb. Berol.).

(2). Var. **albidum** (Koern.) Snowden, comb. nov. *Andropogon Sorghum* var. *albidus* Koern. in Bull. Herb. Boiss. 2, 226 : March 1894 (non Koern. in Bull. Herb. Bois. 2, App. 2, 12 : 1894, vel in Baumann, Massailand, 295 : 1894).

SOUTH WEST AFRICA : Ovamboland ; Ondonga, Olukonda, Schinz (typus).

(3). Var. **cinereum** Snowden, var. nov.; affine var. *albido* (Koern.) Snowden, a quo caryopsidibus cinerascentibus regione mucellari fusco-colorata differt.

SOUTH ANGOLA : Without precise locality, Pearson 123a (typus).

(4). Var. **ondongae** (Koern.) Snowden, comb. nov. *Andropogon Sorghum* var. *ondongae* Koern. in Baumann, Usambara, 319 : 1891 (pro parte ; excl. Baumann's spec.).

SOUTH WEST AFRICA : Ovamboland ; Ondonga, Olukonda, Schinz (typus).

(5). Var. **lasiorhachis** (Hack.) Snowden, comb. nov. *Andropogon Sorghum* subsp. *sativus* var. *lasiorhachis* Hack. in DC. Monogr. Phan. 6, 513 (1889).

GERMANY : ex Hort. Bot. Berol. (typus in Herb. Berol.).

(6). Var. **brunneolum** Snowden, var. nov.; affine var. *albofusco* (Koern.) Snowden, a quo caryopsidibus flavido-brunneis vel brunneis vel rubido-brunneis regione nucellari fusco-colorata differt.

BELGIAN CONGO : Lomami, Robyns 2 (typus).

(7). Var. **sapidum** Snowden, var. nov.; affine var. *melanospermo* (Hack.) Snowden, sed spiculis sessilibus minoribus 3-3.5 mm. longis, caryopsidibus minoribus 3-3.5 mm. longis 2.5-3 mm. latis biconvexis flavidis vel brunneis vel rubidis differt.

SOUTH AFRICA : Zululand ; Pretoria Div. Bot. 22 (typus).

(8). Var. **melanospermum** (Hack.) Snowden, comb. nov. *Andropogon Sorghum* subsp. *sativus* var. *melanospermus* Hack. in DC. Monogr. Phan. 6, 518 (1889).

SOUTH AFRICA : Cape of Good Hope, Banks (typus in Herb. Vindob.).

(9). Var. **breviaristatum** Snowden, var. nov.; affine var. *bicarinato* (Hack.) Snowden, a quo spiculis sessilibus brevioribus

3.5–4 mm. longis, lemmate superiore aristato vel raro mucronato differt.

NORTHERN RHODESIA : Mazabuka, *Moore* 26/1931 (typus).

(10). Var. **bicarinatum** (*Hack.*) *Snowden*, comb. nov. *Andropogon Sorghum* subsp. *sativus* var. *bicarinatus* *Hack.* in DC. Monogr. Phan. **6**, 511 (1889).

HAITI ISLAND : Santo Domingo, *Ritter* (typus in Herb. Vindob.).

(11). Var. **ovoideum** *Snowden*, var. nov.; affine var. *albido* (*Koern.*) *Snowden*, a quo panícula ovoidea obtusa vel truncata densa et compacta 12–20 cm. longa 6–12 cm. lata, caryopsidibus albis flavis rubris vel brunneis differt.

SOUTH WEST AFRICA : Ovamboland ; comm. *District Commissioner* 4 (typus).

(12). Var. **Neesii** (*Koern.*) *Snowden*, comb. nov. *Andropogon Sorghum* var. *Neesii* *Koern.* Handb. Getreideb. **1**, 315 (1885) ; *K. Schum.* in Engl. Pfl. Ost-Afr. B, 47 (1895).

(13). Var. **densissimum** (*Busse et Pilger*) *Snowden*, comb. nov. *Andropogon Sorghum* var. *densissimus* *Busse et Pilger* in Engl. Bot. Jahrb. **32**, 188 (1902).

TANGANYIKA TERRITORY : Ugogo ; Ilindi, *Busse* 271 (typus in Herb. Berol)

25. S. nigricans (*Ruiz et Pavon*) *Snowden*, comb. nov. *Milium nigricans* *Ruiz et Pavon*, Fl. Peruv. **1**, 47 (1798).

PERU : cultivated in Pillao, Cuchero and Pueblo Nuevo (typus in Herb. Hort. Bot. Matrit.).

(1). Var. **cerevisiae** (*Stapf*) *Snowden*, comb. nov. *Sorghum caudatum* var. *cerevisiae* *Stapf* in Prain Fl. Trop. Afr. **9**, 132 (1917).

UGANDA : Toro ; 1500–1600 m., *Dawe* 527 (typus).

(2). Var. **nyanzae** *Snowden*, var. nov.; affine var. *Cerevisiae* (*Stapf*) *Snowden*, a quo spiculis sessilibus nonnihil majoribus 3–3.5 mm. longis, caryopsidibus majoribus 3.5–4 mm. latis, panícula robustiore, pedunculo valido usque ad 2 cm. diametro, ramis crassis prope basin usque ad 7 mm. latis differt.

TANGANYIKA TERRITORY : Ukerewe ; *Dept. Agric.* 129 (typus).

(3). Var. **peruvianum** (*Hack.*) *Snowden*, comb. nov. *Andropogon Sorghum* subsp. *sativus* var. *peruvianus* *Hack.* in DC. Monogr. Phan. **6**, 512 (1889).

PERU : cultivated (1829), ex *Herb. Endl.* (typus in Herb. Vindob.).

(4). Var. **concolor** (*K. Schum.*) *Snowden*, comb. nov. *Andropogon Sorghum* var. **concolor** *K. Schum.* in Engl. Pfl. Ost-Afr. B. **42** (1895).

TANGANYIKA TERRITORY : Ugogo ; Kisokwe, *Stuhlmann* 326 (typus in Herb. Berol.).

(5). Var. **lobatum** *Snowden*, var. nov.; affine var. *peruviano* (Hack.) *Snowden*, a quo panicula matura multilobata, ramulis fasciculatis differt.

BELGIAN CONGO : between Kibali and Ituri, Alur Territory, *Van Overstraeten* (typus).

(6). Var. **Stuhlmannii** (*Koern.*) *Snowden*, comb. nov. *Andropogon Sorghum* var. *Stuhlmannii* (*Koern.*) in *Baumann*, *Massailand*, 295 : 1894 (nomen), et ex *K. Schum.* in *Engl. Pfl. Ost-Afr. B.* 41 (1895).

TANGANYIKA TERRITORY : Unyamwesi ; Mkigua, *Stuhlmann* 476 (typus in Herb. Berol.). Mpwapwa, *Stuhlmann* 230 (in Herb. Berol.).

(7). Var. **ussienne** (*Koern.*) *Snowden*, comb. nov. *Andropogon Sorghum* var. *ussiensis* *Koern.* in *Baumann*, *Massailand*, 295 (1894).

TANGANYIKA TERRITORY : West Ussui, *Baumann* 12 (typus in Herb. Berol.).

(8). Var. **angolense** (*Rendle*) *Snowden*, comb. nov. *Sorghum vulgare* var. *angolense* *Rendle* in *Cat. Afr. Pl. Welw.* 2, 151 (1899). *S. caudatum* var. *angolense* *Stapf* in *Prain, Fl. Trop. Afr.* 9, 132 (1917).

ANGOLA : Cazengo, on low hills by Liunha River, *Welwitsch* 7216 (typus in Herb. Mus. Brit.).

(9). Var. **calcareum** (*Busse et Pilger*) *Snowden*, comb. nov. *Andropogon Sorghum* var. *calcareus* *Busse et Pilger* in *Engl. Bot. Jahrb* 32, 188 (1902).

TANGANYIKA TERRITORY : Ugogo ; Ilindi, *Busse* 276 (typus in Herb. Berol.).

(10). Var. **suffusum** *Snowden*, var. nov. *Panicula* contracta, densa vel laxiuscula, oblonga, lanceolato-oblonga vel elliptico-oblonga, 20–35 cm. longa, 5–12 cm. lata ; rami nisi prope basin graciles et flexuosi, inferiores 5–15 cm. longis. *Spiculae* sessiles late ellipticae vel late obovato-oblongae, 3–3.5 mm. longae, 2.5–3 mm. latae, fere glabrae vel sparse pilosae ; glumae coreaceae ; lemma superius mucronatum. *Caryopsides* maturae glumis longiores, 3.5–4 (raro 4.5) mm. longae, 3–3.5 mm. latae, valde obviae, dorso late ellipticae vel obovato-ellipticae vel obovato-rotundae, biconvexae, flavido-brunneae vel brunneae vel rubido-brunneae. *Spiculae pedicellatae* maturae plerumque deciduae, pedicellis 0.5–2 mm. longis.

BELGIAN CONGO : Ubangi ; Baugyville, *Robyns* 281 (typus).

26. *S. caudatum* *Stapf* in *Prain, Fl. Trop. Afr.* 9, 131–133 :

1917 (pro parte ; excl. vars. *angolense*, *Cerevisiae*, *umbonatum*, *rutilum*, and *atrolutescens*).

ANGLO-EGYPTIAN SUDAN : Jur, Ghatta's Seriba, *Schweinfurth* 180 (typus).

(1). Var. **gibbum** Stapf, l.c. p. 133.

ANGLO-EGYPTIAN SUDAN : Sennar, ex *Rubber Exhibition*, London, 1914 (typus).

(2). Var. **feterita** Stapf, l.c.

ANGLO-EGYPTIAN SUDAN : Geteina District, ex *Rubber Exhibition*, London, 1914 (typus).

(3). Var. **fragile** Stapf, l.c.

ANGLO-EGYPTIAN SUDAN : Sennar, ex *Rubber Exhibition*, London, 1914 (typus).

(4). Var. **talodianum** Snowden, var. nov., affine var. *gibbo* Stapf, a quo panicula et spiculis pilosissimis, spiculae sessilis glumis tenuiter coriaceis maturis lemmata dense ciliata exhibentibus, caryopsidibus dorso late ellipticis vel oblatis albidis flavidis vel rubidis differt.

ANGLO-EGYPTIAN SUDAN : Talodi, ex *Khartoum Plant Breeding Section* 55.M.C.5 (typus).

(5). Var. **caudatum** (Hack.) Snowden, comb. nov. *Andropogon Sorghum* subsp. *sativus* var. *caudatus* Hack. in DC. Monogr. Phan. 6, 517 (1889). *Sorghum caudatum* var. *Schweinfurthii* Stapf in Prain, Fl. Trop. Afr. 9, 133 : 1917 (pro parte).

ANGLO-EGYPTIAN SUDAN : Jur, Ghatta's Seriba, *Schweinfurth* 180 (typus).

(6). Var. **Lens** Stapf, l.c.

UGANDA : Toro ; 1200-1800 m., *Dawe* 528 (typus).

(7). Var. **natae** (Koern.) Snowden, comb. nov. *Andropogon Sorghum* var. *natae* Koern. in Baumann, Massailand, 296 (1894).

TANGANYIKA TERRITORY : Nata, *Baumann* 26 (typus in Herb. Berol.).

(8). Var. **bantuorum** Snowden, var. nov. ; a var. *caudato* (Hack.) Snowden caryopsidibus late obovato-ellipticis vel obovato-rotundis brunneis vel rubidis apice plerumque lato et crasso differt.

BELGIAN CONGO : between Kibali and Ituri ; Walendu Territory, *Schoolmeesters* (typus).

(9). Var. **scoparium** Snowden, var. nov. ; affine var. *bantuorum* Snowden, a quo panicula laxiore oblanceolata umbellata vel corymbiformi, rhachi valde abbreviata, caryopsidibus albidis cinerascentibus rubidis vel brunneis differt.

BELGIAN CONGO : between Kibali and Ituri, Alur Territory, *Chief Dema* (typus).

(10). Var. **durum** Snowden, var. nov. ; affine var. *caudato* (Hack.) Snowden, sed caryopsidibus brevioribus 3·5–4 mm. longis plus minusve biconvexis dorso saepe orbicularibus vel oblatiis endospermo plerumque duro et corneo vel siliceo regione nucellari haud fusco-colorata differt.

ANGLO-EGYPTIAN SUDAN : without precise locality, ex *Rubber Exhibition, London, 1914* (typus).

Vern. name : *Zerzereih*.

(11). Var. **Kerstingianum** (Busse et Pilger) Snowden, comb. nov. *Andropogon Sorghum* var. *Kerstingianus* Busse et Pilger in Engl. Bot. Jahrb. **32**, 187 (1902).

DAHOMY : Sokode, *Kersting* 18 (typus in Herb. Berol.).

(12). Var. **procerum** Snowden, var. nov. ; affine var. *Kerstingiano* (Busse et Pilger) Snowden, a quo panicula graciliore laxiuscula, rhachi plus minusve exposita sparse hirsuta, caryopsidibus raro cereo-flavidis differt.

ANGLO-EGYPTIAN SUDAN : Bahr El Ghazal, *Punter* 35 (typus).

(13). Var. **sudanicum** Snowden, var. nov. ; affine var. *procerum* Snowden, a quo caryopsidibus multo compressis et applanatis calcareis vel cinereis regione nucellari majore fusco-colorata differt.

ANGLO-EGYPTIAN SUDAN : Bahr El Ghazal, *Punter* 34 (typus).

(14). Var. **colorans** (Pilger) Snowden, comb. nov. *Andropogon Sorghum* var. *colorans* Pilger in Notizbl. Bot. Gart. Berl. **4**, 146 (1904).

DAHOMY : (Togoland), *Kersting* (typus in Herb. Berol.).

(15). Var. **Hackelii** (Chiov.) Snowden, comb. nov. *Sorghum eplicatum* var. *Hackelii* Chiov. in Monogr. Rapp. Colon. Rome, No. 19, Oct. 1912, p. 30.

ERITREA : Cheren, ex *International Exhibition, Turin, 1911*, 125 bis (typus in Herb. Florent.).

27. S. dulcicaule Snowden, sp. nov. ; affine *S. caudato* Stapf et *S. caffrorum* Beauv., ab illo spiculis sessilibus maturis hiantibus, glumis caryopsidi maturae aequilongis, spiculis pedicellatis persistentibus, panicula laxiore, culmis dulcibus et succidis, ab hoc spiculis sessilibus obovato-ellipticis vel obovato-oblongis differt.

Culmi validi, usque ad 2·5 m. alti, dulces et succidi. *Folia* 8–12 vel ultra ; laminae usque ad 60 cm. (vel ultra) longae et 6 cm. latae, *Panicula* laxa, elliptica vel elliptico-oblonga, 20–35 cm. longa, 5–12 cm. lata ; rhachis multo exposita, nodis plus minusve villosa ; rami prope basin suberecti et validiusculi, ceterum graciliores, flexuosi et patentes, prope basin et axillis ramulorum villosi, inferi-

ores 10–15 cm. longi. *Spiculae sessiles* obovato-ellipticae vel obovato-oblongae, obtusae vel breviter acutae, 4–5 mm. longae, 2.5–3.5 mm. latae, praecipue prope margines et apicem versus perpetuo strigosopilosae. *Glumae* aequales, coriaceae; inferior prope apicem tenuiter et obscure bicarinata. *Lemmata* hyalina, tenuiter ciliata; superius mucronatum. *Caryopsides* maturae glumis plus minusve aequilongae, ab utraque fere liberae vel ab altera comprehensae facile caducae, 4–4.5 mm. longae, 3–3.75 mm. latae, dorso late ellipticae vel rotundatae, plano-convexae, flavidae vel rubido-brunneae vel atro-brunneae; endospermum farinaceum, regione nucellari fuscolorata. *Spiculae pedicellatae* elliptico-lanceolatae vel anguste lanceolatae, 3–4.5 mm. longae, steriles, persistentes, pedicellis ciliatis 0.5–1.5 (raro 2) mm. longis.

BELGIAN CONGO: Katanga District; between Luapula and Kilwa, *Marchal* 3 (typus).

SUB-SERIES vi. DURRA.

Spiculae sessiles aut transverse rugosae et circa medium depressae (et tunc *glumae* saepe tenuiter chartaceae) aut sub anthesi gluma inferiore cum apice herbaceo valde striatinervi, late ovatae, obovatae, obovato-ellipticae, obovato-oblongae, rhomboideae vel subhexagonae *caryopsides* maturae glumis aequilongae vel plerumque multo longiores et facile caducae (excl. *S. rigido* Snowden); *spiculae pedicellatae* pedicellis brevibus 0.5–2 mm. longis persistentibus (excl. *S. rigido* Snowden) praeditae; panicula plerumque densa et compacta vel interdum laxa, rhacheos rami et ramuli tomentosi vel villosi (excl. *S. rigido* Snowden).

28. *S. rigidum* Snowden sp. nov.; affine *S. Durra* Stapf et *S. Ankolib* Stapf, ab illo *caryopsidibus* maturis glumis brevioribus, *spiculis pedicellatis* maturis deciduis, *pedicellis* 3–5 mm. longis, panicula fere glabra, ab hoc *spiculis sessilibus* magis obovato-ellipticis, *lemmate* superiore longiaristato, *caryopsidibus* maturis inter glumes magis obviis, *pedicellis* longioribus, *spiculis pedicellatis* deciduis differt.

Culmi validi, usque ad 3 m. alti vel ultra, prope basin 2 cm. lati. *Folia* usque 20 vel plura; *laminae* summae usque ad 40 cm. longae, 6 cm. latae. *Panicula* nonnihil contracta, lanceolata vel oblonga, 20–35 cm. longa, 7–10 cm. lata; *rhachis* superne scabrida, ceterum glabrescens; *rami suberecti*, prope basin validi, ceterum graciliores, firmi necnon tandem rigidi, superne scabridi, ceterum pilis paucis albis crassiusculis prope basin et in axillis ramulorum exceptis glabri. *Spiculae sessiles* late ellipticae vel obovato-ellipticae, acutae, sub anthesi 6–8 mm. longae, 3.5–4 mm. latae, maturae latius obovato-ellipticae et usque ad 5.5 mm. latae, glabrae, opacae vel nonnihil nitentes. *Glumae* aequales, triente superiore tenuiter herbaceae, ceterum coriaceae, apicibus maturis satis fragilibus; gluma inferior tenuiter bicarinata, carinis scabrida. *Lemmata*

hyalina, sparse vel modice ciliata ; superius arista usque ad 14 mm. longa praeditum. *Caryopsides* maturae inter glumas partim inclusae vel leviter obviae, glumis breviores, dorso subrotundae vel orbiculares, 5-5.5 mm. longae, 4.75-5 mm. latae, 3 mm. crassae, fulvo-rubrae vel rubidae. *Spiculae pedicellatae* lineari-lanceolatae vel cultratae, 8-11 mm. longae, ♂ vel nonnunquam hermaphroditae, maturae deciduae.

ANGLO-EGYPTIAN SUDAN : Blue Nile District, Kamlin, *Punter* 85 (typus).

29. **S. Durra** (Forsk.) *Battand. et Trab.* Fl. Algér, Monocot 128 : 1895 (pro prole) ; *Stapf* in *Prain* Fl. Trop. Afr. 9, 129 : 1917 (pro species).

(1). Var. **aegyptiacum** (Koern.) *Snowden*, comb. nov. *Andropogon Sorghum* var. *aegyptiacus* Koern. apud Aschers. et Schweinf. in *Mém. Inst. Egypt*, 2 (Illustr. Fl. d'Egypt, 164 : 1887).

EGYPT : Assouan ; *Ehrenberg* (typus in Herb. Berol.).

(2). Var. **Fiorii** (Chiov.) *Snowden*, comb. nov. *Sorghum eplicatum* var. *Fiorii* Chiov. in *Monogr. Rapp. Colon. Rome*, No. 19, Oct. 1912, p. 31.

ERITREA : without precise locality, ex *International Exhibition, Turin, 1911*, 90 (typus in Herb. Florent.).

(3). Var. **rutilum** (*Stapf*) *Snowden*, comb. nov. *Sorghum caudatum* var. *rutilum* *Stapf* in *Prain*, Fl. Trop. Afr. 9, 133 (1917).

ANGLO-EGYPTIAN SUDAN : without precise locality, ex *Rubber Exhibition, London, 1914* (typus).

(4). Var. **niloticum** (Koern.) *Snowden*, comb. nov. *Andropogon Sorghum* var. *niloticus* Koern. apud Aschers. et Schweinf. in *Mém. Inst. Egypt*, 2, (Illustr. Fl. d'Egypt, 778 : 1889).

EGYPT : Massarah above Cairo, *Schweinfurth* (mature panicle ; typus in Herb. Berol.).

(5). Var. **melanoleucum** (Chiov.) *Snowden*, comb. nov. *Sorghum eplicatum* var. *melanoleucum* Chiov. in *Monogr. Rapp. Colon. Rome*, No. 19, Oct. 1912, p. 30. *S. caudatum* var. *atrolutescens* *Stapf* in *Prain*, Fl. Trop. Afr. 9, 133 (1917).

ERITREA : Barentu, ex *International Exhibition, Turin, 1911*, 22 (typus in Herb. Florent.).

(6). Var. **mediocre** (*Burkill*) *Snowden*, comb. nov. *Andropogon Sorghum* var. *mediocris* *Burkill* ex *Benson et Subba Rao*, *Madras Dept. Agric. Bull.* No. 55, 68 : 1906 (pro parte ; excl. subv. *fuscescens* et subv. *ruber*.)

INDIA : Madras ; *Kristna*, ex *Herb. Rep. Econ. Prod. India* 15560 (typus).

(7). Var. **coimbatoricum** (Burkill) Snowden, comb. nov. *Andropogon Sorghum* var. *coimbatoricus* Burkill ex Benson et Subba Rao, l.c.

INDIA : Madras ; Coimbatore District, ex *Herb. Rep. Econ. Prod. India* 15593 (typus).

(8). Var. **javanicum** (Hack.) Snowden, comb. nov. *Andropogon Sorghum* subsp. *sativus* var. *javanicus* Hack. in DC. Monogr. Phan. 6, 517 (1889).

AUSTRIA : Vienna, cultivated in the Botanical Gardens, seed from Java (typus in Herb. Vindob.).

(9). Var. **fecundum** Snowden, var. nov. *Panicula* compacta vel raro nonnihil laxa, ovata, elliptico-oblonga vel elliptica, 7–15 (raro 20) cm. longa, 5–10 cm. lata ; rami breves et rigidi vel raro longiores et nonnihil flexuosi. *Spiculae* sessiles obovato-ellipticae, 4.5–5.5 mm. longae, 3–3.5 mm. latae, prope margines et apicem versus pilosae ; glumae ad medium tenuiter coriaceae, ceterum herbaceae vel subpapyraceae, apicibus maturis fragilibus ; lemma superius arista 8–12 mm. longa praeditum (raro mucronatum). *Caryopsides* maturae inter glumas apice magis obviae, 4–5.5 mm. longae, 3.5–4.5 mm. latae, dorso ellipticae vel obovato-ellipticae, albidiae, flavidae vel ochraceae. *Spiculae pedicellatae* 4–6 mm. longae.

INDIA : Bombay ; Sind, ex *Herb. Econ. Bot. Poona Agric. Coll.* 40 (typus).

(10). Var. **eois** (Burkill) Snowden, comb. nov. *Andropogon Sorghum* var. *eois* Burkill ex Benson et Subba Rao in Madras Agric. Bull. No. 55, 67 (1906).

INDIA : Punjab ; Dera Ismail Khan, ex *Herb. Rep. Econ. Prod. India* 15924 (typus).

(11). Var. **elongatum** Snowden, var. nov. ; a var. *fecundo* Snowden differt panicula laxiore et longiore oblonga vel lanceolato-oblonga 15–30 cm. longa, ramis longioribus basi exepa flexibilibus, spiculis sessilibus usque ad 6 mm. longis et 4 mm. latis, spiculis pedicellatis 6–9 mm. longis.

INDIA : Bombay ; Sind, ex *Herb. Econ. Bot. Poona Agric. Coll.* 26 (typus).

(12). Var. **erythrocarpum** (Chiov.) Snowden, comb. nov. *Sorghum eplicatum* var. *erythrocarpum* Chiov. in Monogr. Rapp. Colon. Rome, No. 19, Oct. 1912, p. 29.

ERITREA : Barentu, ex *International Exhibition, Turin, 1911*, 23 (typus in Herb. Florent.).

(13). Var. **fuscum** Snowden, var. nov. ; affine var. *fecundo* Snowden, sed glumae apicibus maturis haud fragilibus, caryopsidibus

minoribus maturis inter glumas nonnunquam fere inclusis 3–4 mm. longis 2·5–3 mm. latis fulvo-rubris vel rubris vel brunneis differt.

INDIA : Bombay ; Sind, Hyderabad, *Navani* 2 (typus).

(14). Var. **rivulare** *Snowden*, var. nov. ; a var. *nilotico* (Koern.) *Snowden* differt spiculis sessilibus majoribus latius obovatis glabrescentibus 5–6 mm. longis maturis usque ad 5 mm. latis apice primo haud luteo-tinctis, caryopsidibus dorso orbicularibus vel oblatiis 4·5–5 mm. latis albidis vel fulvis vel rubidis.

ANGLO-EGYPTIAN SUDAN : White Nile, *Punter* 56 (typus).

(15). Var. **luteolum** *Snowden*, var. nov. ; affine var. *rivulari* *Snowden*, sed panicula saepe cylindrica truncata, spiculis sessilibus apice primo luteo-tinctis, lemmate superiore longiaristato, caryopsidibus eburneo-flavis vel flavis, spiculis pedicellatis primo luteo-tinctis differt.

EGYPT : Fashn, *Didgeon* B (typus).

(16). Var. **maximum** *Snowden*, var. nov. ; a var. *rivulari* differt spiculis sessilibus latioribus maturis usque ad 6 mm. latis sub anthesi apicibus valde depressis, lemmate superiore saepe aristato, caryopsidibus usque ad 6 mm. longis et latis.

ANGLO-EGYPTIAN SUDAN : Gedarif, *Punter* 5 (typus).

30. **S. cernuum** *Host*, Gram. 4, 2, Tab. 3 (1809).

(1). Var. **Truchmenorum** (*Koern.*) *Snowden*, comb. nov. *Andropogon Sorghum* var. *Truchmenorum* *Koern.* in Handb. Getreideb. 1, 315 (1885) ; *Sorghum Truchmenorum* *C. Koch* in *Linnaea* 21, 442 (1848).

RUSSIA : Transcaspian Province, *Koch* (typus).

(2). Var. **yemense** (*Koern.*) *Snowden*, comb. nov. *Andropogon Sorghum* var. *yemensis* *Koern.* in Bull. Herb. Bois. 2, App. 2, 11 : 1894 (non *Koern.* in *Baumann*, *Massailand* 295 : (1894).

ARABIA : Yemen. east of Marraua, *Schweinfurth* 162 (typus in Herb. Berol.)

(3). Var. **agricolarum** (*Burkill*) *Snowden*, comb. nov. *Andropogon Sorghum* var. *agricolarum* *Burkill* ex *Benson et Subba Rao* in Madras Dept. Agric. Bull. No. 55, 67 : 1906 (pro parte ; subv. *rubescens*).

INDIA : Central Provinces ; Ellichpur District, ex *Herb. Rep. Econ. Prod. India* 22941 (typus).

(4). Var. **globosum** (*Hack.*) *Snowden*, comb. nov. *Andropogon Sorghum* subsp. *sativus* var. *globosus* *Hack.* in DC. Monogr. Phan. 6, 517 (1889).

INDIA : Bihar & Orissa ; Serampur, *Voigt* (typus in Mus. Bot. Haun.).

(5). Var. **orbiculatum** *Snowden*, var. nov. *Panicula* oblonga vel ovato-oblonga, densa et compacta vel nonnunquam laxiuscula, 8–20 cm. longa, 4–12 cm. lata, rami prope basin validiusculi et nonnihil rigidi, ceterum magis graciles, inferiores usque ad tertiam partem paniculae longi. *Spiculae* sessiles ovatae vel nonnihil obovato-oblongae, 4–5.5 mm. longae, 3–4 mm. latae ; glumae tenues et papyraceae vel crassiusculae et spongiosae ; inferior saepe transverse rugosa et circa medium depressa ; lemma superius aristatum. *Caryopsides* maturae valde obviae, glumis longiores, 4–5 mm. longae et latae, dorso rotundatae vel orbiculares, valde compressae et applanatae, albiae, flavidae vel rubidae. *Spiculae pedicellatae* 4–5 mm. longae, persistentes, pedicellis 0.5–1.5 mm. longis.

INDIA : Central Provinces ; Yeotmal, *Youngman* 56 (typus).

(6). Var. **subcylindricum** *Snowden*, var. nov. ; affine var. *orbiculato* *Snowden*, sed panicula densa et compacta subcylindrica sursum nonnihil conica 5–15 cm. longa et 4–8 cm. lata, caryopsidibus minus compressis 3.5–4 mm. longis et 3–3.5 mm. latis eburneo-flavis vel flavis differt.

INDIA : Bombay ; Poona, ex *Herb. Econ. Bot. Poona Agric. Coll.* 65 (typus).

(7). Var. **cernuum** (*Koern.*) *Snowden*, comb. nov. *Andropogon Sorghum* var. *cernuus* *Koern.* in *Handb. Getreideb.* 1, 314 : 1885 (pro parte) ; *Holcus cernuus* *Ard.* in *Saggi Sc. Lettr. Accad. Padova*, 1, 128. t. 3, figs. 1, 2 (1786).

31. **S. subglabrescens** (*Steud.*) *Schweinf. et Aschers.* in *Schweinf. Beitr. Fl. Aethiop.* 302, 306 (1867). *Andropogon subglabrescens* *Steud. Syn. Pl. Glum.* 1, 393 (1854).

(1). Var. **pabulare** *Snowden*, var. nov. *Culmi* comparatavi graciles, usque ad 1.5 m. alti. *Folia* numerosa, usque ad 50 cm. longa et 4 cm. lata. *Panicula* laxa vel nonnihil contracta, oblonga vel elliptico-oblonga, 10–20 cm. longa, 2–6 cm. lata ; rami nisi prope basin graciles, inferiores 2–5 cm. longi. *Spiculae* sessiles 4–5 mm. longae, primo pilosae, maturae glabrescentes ; glumae nisi prope basin tenuiter papyraceae ; lemma superius aristatum ; caryopsides maturae glumis aequilongae vel raro longiores, usque ad 4 mm. longae et 3 mm. latae, dorso ellipticae vel obovatae, biconvexae, apice late rotundatae, albiae, eburneo-flavae vel fulvae.

INDIA : Bombay ; Baroda, *Ryan* (typus).

(2). Var. **rugulosum** (*Hack.*) *Snowden*, comb. nov. *Andropogon Sorghum* subsp. *sativus* var. *rugulosus* *Hack.* in *DC. Monogr. Phan.* 6, 508 (1889).

ABYSSINIA : Cultivated, ex *Herb. Braun* (typus in *Herb. Berol.*).

(3). Var. **paniculatella** (*Chiov.*) *Snowden*, comb. nov. *Sorghum basiplicatum* var. *paniculatella* *Chiov.* in *Monogr. Rapp. Colon. Rome*, No. 19, Oct. 1912, p. 38.

ERITREA : without precise locality, ex *International Exhibition, Turin, 1911*, 9 (typus in *Herb. Florent.*)

(4). Var. **microcarpum** (*Chiov.*) *Snowden*, comb. nov. *Sorghum basiplicatum* var. *microcarpum* *Chiov.* in *Monogr. Rapp. Colon. Rome*, No. 19, Oct. 1912, pl. 46.

ERITREA : without precise locality, ex *International Exhibition, Turin, 1911*, 93 (typus in *Herb. Florent.*).

(5). Var. **leiocladum** *Snowden*, var. nov. *Panicula* laxa, oblanceolata, circa 25 cm. longa et 10 cm. lata ; rami suberecti, nisi prope basin graciles, laeves et pilis paucis prope basin exceptis fere glabri, inferiores usque ad 12 cm. longi. *Spiculae sessiles* 4-5 mm. longae, maturae glabrae vel fere glabrae ; glumae nisi prope basin et infra apicem tenuiter papyraceae ; lemma superius aristatum ; caryopsides maturae glumis fere aequilongae, 4-4.5 mm. longae, 2.75-3 mm. latae, dorso obovatae vel subrotundae, apices rotundatae et plus minusve obviae, ferrugineae vel rubido-brunneae.

ABYSSINIA : Schoa, 2300 m., *Ellenbeck* 1637 (typus in *Herb. Berol.*).

(6). Var. **rubidum** (*Burkill*) *Snowden*, var. nov. *Andropogon Sorghum* var. *irungiformis* subv. *rubidus* *Burkill* ex *Benson et Subba Rao* in *Madras Agric. Bull.* No. 55, 68 (1906). Affine var. *leioclado* *Snowden*, sed panicula contracta et densa vel raro laxiuscula oblonga vel elliptico-oblonga, 10-25 cm. longa, ramis plus minusve scabridis inferioribus usque ad tertiam partem paniculae longis, caryopsidibus maturis 3-4 mm. latis differt.

INDIA : Madras ; Coimbatore ex *Herb. Rep. Econ. Prod. India, Barber* 961 (typus).

(7). Var. **compactum** (*Burkill*) *Snowden*, comb. nov. *Andropogon Sorghum* var. *compactus* *Burkill* ex *Benson et Subba Rao*, l.c. pp. 67, 69 (pro parte ; excl. subv. *roseus*).

INDIA : Madras ; Bellary, ex *Herb. Rep. Econ. Prod. India* 17840 (typus).

(8). Var. **irungiforme** (*Burkill*) *Snowden*, comb. nov. *Andropogon Sorghum* var. *irungiformis* *Burkill* ex *Benson et Subba Rao*, l.c. p. 68 (pro parte ; excl. subv. *sulphureus* et subv. *rubidus*).

INDIA : Madras ; Trichinopoly, ex *Herb. Rep. Econ. Prod. India* 15610 (typus).

(9). Var. **oviforme** Snowden, var. nov. *Culmi* saepe dulces, 1-2.5 m. alti. *Panicula* matura densa et compacta, saepe cernua, ovata vel subovata, 10-15 cm. longa, 6-10 cm. lata; rami plus minusve rigidi, inferiores usque ad 6 cm. longi. *Spiculae* sessiles 4-5 mm. longae, 2.5-4 mm. latae, maturae glabrae vel fere glabrae; lemma superius aristatum; caryopsides maturae valde obviae, 3.75-5 mm. longae, 2.25-4 mm. latae, dorso obovatae, eburneo-flavae, fulvae, vel rubidae.

INDIA : Bombay ; Poona, ex *Herb. Econ. Bot. Poona Agric. Coll.* 72 (typus).

(10). Var. **abyssinicum** (Hack.) Snowden, comb. nov. *Andropogon Sorghum* subsp. *sativus* var. *abyssinicus* Hack. in DC. Monogr. Phan. 6, 518 (1889).

ABYSSINIA : without precise locality, *Dillon & Petit* (typus in *Herb. Vindob.*).

(11). Var. **subglabrescens** (Hack.) Snowden, comb. nov. *Andropogon Sorghum* subsp. *sativus* var. *subglabrescens* Hack. in DC. Monogr. Phan. 6, 519 (1889).

ABYSSINIA : hillsides above Jelajeranne, *Schimper* 623 (typus).

(12). Var. **Schimperi** (Hack.) Snowden, comb. nov. *Andropogon Sorghum* subsp. *sativus* var. *Schimperi* Hack. in DC. Monogr. Phan. 6, 518 (1889).

ABYSSINIA ; without precise locality, *Schimper* 968 (typus).

(13). Var. **leucocarpum** (Chiov.) Snowden, comb. nov. *Sorghum basiplicatum* var. *leucocarpum* Chiov. in Monogr. Rapp. Colon. Rome, No. 19, Oct. 1912, p. 42.

ERITREA : without precise locality, ex *International Exhibition, Turin, 1911*, 131 (typus in *Herb. Florent.*).

(14). Var. **umbonatum** (Stapf) Snowden, comb. nov. *Sorghum caudatum* var. *umbonatum* Stapf in Prain, Fl. Trop. Afr. 9, 133 (1917).

ANGLO-EGYPTIAN SUDAN : without precise locality, ex *Rubber Exhibition, London, 1914* (typus).

(15). Var. **rubrocernuum** (Koern.) Snowden, comb. nov. *Andropogon Sorghum* var. *rubrocernuus* Koern. in Bull. Herb. Boiss. 2, App. 2, 12 (1894).

ARABIA : Yemen : Hodjela and Menacha, *Schweinfurth* (typus).

(16). Var. **arabicum** (Koern.) Snowden, comb. nov. *Andropogon Sorghum* var. *arabicus* Koern. in Bull. Herb. Boiss. 2, App. 2, 12 (1894).

ARABIA : Yemen ; above Menacha, near El Ejan, 2600 m. *Schweinfurth* (typus).

(17). Var. **latum** Snowden, var. nov. *Panicula* contracta et densa vel laxiuscula, robustae, ovata, elliptica, vel oblonga, 15–25 cm. longa, 7–12 cm. lata; pedunculus validus, 1–2.5 cm. latus, saepe recurvus; rami prope basin validi vel validissimi, ceterum graciles sed rigidi, inferiores 5–10 cm. longi. *Spiculae sessiles* 4–5.5 mm. longae, 3–5 mm. latae, maturae glabrae vel prope apicem et margines, parce pilosae; glumae prope basin et infra apicem crassiusculae spongiosae vel subcoriaceae, ceterum subpapyraceae; lemma superius aristatum vel mucronatum; caryosides maturae glumis nonnihil longiores valde obviae, 4–5 mm. longae, 3.5–5 mm. latae, dorso rotundatae, orbiculatae, oblatae vel obovatae, albidae, flavae, vel rubidae.

BRITISH SOMALILAND: without precise locality, *Farquharson* 1 (typus).

XXII—NEW TREES AND SHRUBS FROM TROPICAL AFRICA: IV*. A. C. HOYLE AND H. DUNKLEY.

Dasylepis Burtt-Davyi Edlin, sp. nov. [Flacourtiaceae]; affinis *D. integræ* Warb., sed foliis basi cuneatis, racemis pedicellisque brevioribus differt.

Arbor glabra; ramuli tenues, cinereo-brunnei; stipulae caducae; petioli 5 mm. longi, canaliculati. *Folia* coriacea, 10–15 cm. longa, 3–5 cm. lata, venis elevatis reticulata, elliptico- vel oblongo-lanceolata, plus minusve falcata, apice acuta, basi late cuneata, margine integro; nervi laterales utrinque 6–9, arcuatim ascendentes, crebre conjuncti. *Racemi* pauciflori, axillares, 3–4 cm. longi; pedicelli brevissimi, dense bracteati, ad 2 mm. longi; bracteae orbiculatae, cupulares, ad 1 mm. diametro, ciliatae. *Flores* (alabastra tantum visa) 5 mm. diametro. *Perianthii* segmenta circiter 10, valde inaequalia, ciliata; 3 externa bracteis similia, coriacea, orbiculata, 2–3.5 mm. diametro; 2 intermedia chartacea, petaloidea nec tamen squamata, late elliptica, 4 mm. longa, 3 mm. lata; 5 interna chartacea, petaloidea, latissime elliptica vel obovata, 4–5 mm. longa, 3–4 mm. lata, unumquodque squama basali tomentosa adnata 1.5 mm. longa munitum. *Stamina* circiter 20; filamenta complanata, 2 mm. longa; antherae 3 mm. longae, lineari-lanceolatae. *Ovarium* sulcatum, glabrum, 2–3 mm. longum; styli 3, praeter medium connati, apice divaricati; placentae parietales ovulis numerosis.

SOUTH TROPICAL AFRICA. Nyasaland: Mlanje Mountain, Lichenya Plateau, about 6,500 ft. altitude, September, 1929, *Burt Davy* 22043, type, in Kew herb., and Imperial Forestry Institute herb., Oxford.

* Continued from K.B. 1934, 190.

A tree of the montane evergreen rain forest, associated with *Aphloia myrtiflora* Galp., *Royena lucida* L., *Canthium Gueinzii* Sond., *Lasianthus kilimandscharicus* K. Sch., and species of *Garcinia*.

The above description and part of the type specimen have been submitted to Dr. H. Sleumer of Dahlem, Berlin, who agrees that the species is distinct, and has recommended its publication.

***Grewia velutinissima* Dunkley**, sp. nov. [Tiliaceae]; affinis *G. cordatae* N.E. Br., a qua sepalis longioribus, stylo brevioribus staminibus haud superante, foliis basi oblique rotundatis nec cordatis recedit.

Arbor parva, trunco circiter 12 cm. diametro, juvenilibus omnino dense fulvo-stellato-tomentosis. *Stipulae* 6 mm. longae, oblique lanceolato-subulatae, latere superiore plus minusve lobatae. *Folia* 5-7.5 cm. longa, 3-4.5 cm. lata, oblique oblonga vel obovato-oblonga, apice irregulariter rotundata vel obtusa, basi oblique rotundata vel subtruncata, 3-5-nervia, supra viridia et breviter stellato-tomentosa, infra manifeste pallidiora pilis stellatis griseo-fulvis tomentosa, margine irregulariter crenulato-serrulata; nervi laterales supra utrinque 4, subtus prominentes, venis parallelis; petiolus 5 mm. longus. *Cymae* axillares, umbelliformes, pauciflorae, plerumque fasciculatae; pedunculi 1-1.5 cm. longi; pedicelli 3-5 mm. longi; bracteae basales minutae, caducae; bracteolae 5 mm. longae, lanceolatae, extra fulvo-tomentosae, intus parce glanduloso-pubescentes. *Alabastra* 8-10 mm. longa, 4 mm. lata, oblongo-ovoidea. *Sepala* 1-1.3 cm. longa, 3 mm. lata, lineari-lanceolata, unicostata, stellato-pustulata. *Petala* 6 mm. longa, 3 mm. lata, obovata, limbo membranaceo, glandula orbiculata, margine fimbriato atque tomentoso-ciliato. *Stamina* glabra, 7-9 mm. longa. *Ovarium* sessile, dense pilosum, stylo crasso sulcato, stigmate 4-lobato. *Fructus* 1-2-pyrenus, olivaceus, pilis longis stellatis sparse nuntius; pyrenae sphaericae, 7-10 mm. diametro, 3-6-loculares, 1-2-spermae (2-4 loculis abortivis), pericarpio carnosulo, mesocarpio fibrato, endocarpio crasso corneo stramineo. *Semina* ellipsoidea, lateraliter compressa, circiter 4.5 mm. longa, pallide griseo-brunnea.

SOUTH TROPICAL AFRICA. Northern Rhodesia: Bombwe, J. D. Martin 350 (flowers), 642 (fruits from same tree), type, in Kew herb. and Imperial Forestry Institute herb., Oxford; "small tree, 5" diameter at breast height"; flowers in Nov., 1932, fruits in April, 1933.

Vernacular names: "muNzo" (Chitoka); "muUndu" (Chikaondi).

***Hibiscus Burtt-Davyi* Dunkley**, sp. nov. [Malvaceae]; affinis *H. gossypino* Thunb., sed omnibus membris multo majoribus, seminibus glabris (haud gossypinis), epicalycis segmentis pluribus longioribus, quam calycis lobis facile distinguitur.

Frutex erectus, circiter 2 m. altus, omnino stellato-tomentosus. *Folia* ovato-lanceolata, vel irregulariter trilobata, 6-12 cm. longa, 3-6 cm. lata, basi rotundata, quinquenervia, apice acuta, supra pilis stellatis adpressis scabrida, in sicco brunneo-viridia, subtus pallida, densius stellato-ferrugineo-tomentosa, nervis venisque utrinque elevatis, margine irregulariter crenato, petiolo crasso 2-3 cm. longo. *Stipulae* filiformes, 5 mm. longae. *Flores* terminales, breviter pedunculati. *Epicalycis* lobi 17, filiformes, 2 cm. longi. *Calyx* campanulatus, intus pilis simplicibus brevibus aureis, extra pilis longioribus furcatis fuscis dense vestitus; lobi lanceolato-ovati, tricostati, 1.5 cm. longi, 0.8 cm. lati. *Corolla* 4.5 cm. longa, purpurea. *Columna staminea* integra, 1.5 cm. longa. *Ovarium* 5-loculare, longe pilosum; ovula in loculis 3. *Stylus* basi simplex, superne 5-furcatus; rami minute pubescentes, apice capitato-stigmatosi. *Fructus* vix 1 cm. longus, longe pilosus, epicalycis bracteis et calyce persistentibus cinctus. *Semina* plerumque 2 pro loculo, reniformia, glabra, 3 mm. longa, 2 mm. lata, 1.5 mm. diametro.

SOUTH TROPICAL AFRICA. Nyasaland: Mt. Mlanje, *J. Burt Davy* 22097, type, in Kew herb. and Imperial Forestry Institute herb., Oxford, "shrub 4-6 ft. fringing the forest at about 7,000 ft. on the slopes of the plateau basin, Lichenya Plateau, Mt. Mlanje," Sept. 24th, 1929; Tuchila Plateau, 6,000 ft. alt., *J. M. Purves* 84, "a shrub 4-6 ft.," August, 1901.

This handsome species occurs on the outer margin of the mixed evergreen montane rain-forest (*Rapanea-Aphloia* - *Lachnopylis-Olinia-Olea* association) associated with *Vaccinium africanum* Britt., *Helichrysum Hochstetteri* Hook. f., *Phyllanthus guineensis* Pax, *Angraecum verrucosum* Rendle, and a species of *Elaeodendron* (22102). The Hibiscus is worthy of cultivation as an ornamental shrub; coming from a comparatively high altitude (7,000 ft.) with cold winter nights and a good average rainfall, it is not unlikely that the species would prove hardy in the open in the warmer and moister parts of Western England, Scotland and Ireland.

J. B. D.

***Drypetes Vignei* Hoyle**, sp. nov. [Euphorbiaceae - Phyllanthaeae]; affinis *D. Dinklagei* (Pax) Hutch., a qua pedicellis ♂ longioribus, fructu minore haud longe setoso, foliis regulariter et plerumque acute crenato-serratis, recedit.

Arbor ramosa, 8-13 m. alta, ramulis novellis tenuibus sulcatis ferrugineo-pubescentibus mox glabris. *Folia* saepe subdisticha, tenuiter coriacea, utrinque reticulata, glabra, 10-25 cm. longa, 5-10 cm. lata, elliptica vel ovato-elliptica vel oblongo-elliptica vel lanceolata, apice plerumque longiuscule et obtuse acuminata, basi sensim vel breviter cuneata, margine distanter crenato-serrata rarissime subintegra; nervi laterales praecipui utrinque 5-7, arcuatim adscendentes, crebre conjuncti; petiolus 5-10 mm. longus, ferrugineo-pubescent. *Flores* ♂ axillares, fasciculati, pro axilla

10-15; bracteae ovato-rotundatae, 1.5 mm. longae, ferrugineo-tomentellae, caducae; pedicelli 3-5 mm. longi, tomentelli. *Sepala* 5, inaequalia, ovata vel rotundata, obtusa, 2.5-3 mm. longa, extra tomentella, intus marginem versus tomentella, aliter glabra. *Stamina* 4-6, filamentis circiter 1 mm. longis. *Discus* cupularis, coriaceus, ater, valde plicatus et crenulato-crispatus, glaber. *Flores* ♀ haud visi. *Fructus juvenilis* in axillis solitarius, pedicello 6-7 mm. longo tomentello, sepalis deciduis, disco tenue persistente breviter cupulari, stylis patentibus breviter linearibus, stigmatibus transverse elongato canaliculato. *Fructus maturus* bilocularis, carnosulus, ovoideo-globosus, circiter 1.8 cm. diametro, ferrugineo-tomentellus, pedicello circiter 1 cm. longo tomentello. *Semina* pro loculo 1, oblongo-ellipsoidea, rubro-brunnea, rugulosa, 13 mm. longa, 5-6 mm. crassa, albumine amplo incano duriusculo.

WEST TROPICAL AFRICA. Gold Coast: Mampong Scarp at 1,500 ft. altitude, *C. Vigne* 1062, type, in Kew herb. and Imperial Forestry Institute herb., Oxford, with male flowers, March, 1928; Southern Scarp Reserve, *H. W. Moor* 2344, with mature fruits, May, 1931; E. Akim, Konkong, *W. H. Johnson* 595, with very young fruits, 9th March, 1900; Bonsu, *Mrs. R. Burnett* 72, with young fruits, March 1926; Southern Scarp Reserve, *H. W. Moor* 2105, leaves only, Dec., 1930. "Tree 25-40 ft. high, with very spreading branches, common in places in closed forest as understorey. White flowers and small round fruits."

Vernacular name (Ashanti): "Opahah" or "Opaha."

***Gelonium occidentale* Hoyle, sp. nov.** [Euphorbiaceae-Crotoneae]; a congeneribus africanis foliis magnis subsessilibus obtuse caudato-acuminatis basi cordatis satis distincta.

Frutex parvus, glaber, usque ad 2 m. altus, ramulis tenuibus flexuosis fusco-viridibus sulcatis primum angulatis. *Folia* in sicco viridia, sessilia vel brevissime petiolata, 10-18 cm. longa, 3.5-8 cm. lata, oblanceolata vel obovata vel oblongo-elliptica, apice plerumque abrupte et obtuse subcaudato- vel breviter acuminata, basi rotundata vel subcordata, utrinque laxe et subprominenter reticulata et inter venas glanduloso-vesiculata; nervi laterales praecipui utrinque 5-8, oblique patentes, 3-5 mm. intra marginem arcuatim conjuncti. *Flores* ♂ pauci, subsessiles, plerumque 3-6 pro fasciculo, foliis oppositi. *Sepala* 5 vel 6, eglandulosa, orbiculata, 3 externa subcoriacea 3 mm. diametro, 2-3 interna minora, membranacea, petaloidea. *Stamina* 20-30; antherae oblongae, 1 mm. longae; filamenta aequilonga, circa et in disco favoso inserta. *Flores* ♀ 1-2 pro fasciculo (alabastra tantum visa). *Sepala* verisimiliter 3+3, externa valde imbricata, cucullata, interna minora membranacea petaloidea, leviter ciliolata. *Discus* inconspicuus, membranaceus, crenulatus, staminodiis minutissimis inter crenaturas dispositis. *Ovarium* 3-loculare, glabrum, stylis 2-fidis in alabastro incurvis. *Fructus* tricoccus, circiter 1.4 cm. diametro, viridis,

glaber, depresse 3-lobatus, lobis rotundatis, coccis ab axe persistente separantibus.

WEST TROPICAL AFRICA. Gold Coast : Mampong Scarp, 1,600 ft. altitude, *C. Vigne* 2754 (♂) type, with flowers Feb., 1933, 2755 (♀) with flowers and fruits Feb., 1933, in Kew herb. and Imperial Forestry Institute herb., Oxford ; Ofin Headwaters Reserve, 1,500 ft. altitude, *C. Vigne* 3124 (♂) with flowers, October, 1933. "Shrub 6 ft. high, undergrowth in closed forest."

Grossera Vignei Hoyle, sp. nov. [Euphorbiaceae - Crotonaeae]; affinis *G. macranthae* Pax, a qua panicularum ramulis pedicellisque tenuioribus, floribus omnino minoribus, sepalis petalisque minoribus, petalis tenuiter membranaceis subintegris glabris, disco filamentisque fere glabris, recedit.

Arbor 5-15 m. alta, ramulis novellis brunneo-purpureis primum fulvo-tomentosis vel pubescentibus mox fere glabris. *Stipulae* minutae, lanceolatae, caducae. *Petioli* longiusculi, 2-7 cm. longi, apice pulvinati, latere inferiori dense pubescentes. *Folia* tenuiter coriacea, 8-30 cm. longa, 3-12 cm. lata, oblanceolata vel obovata vel elliptica, apice obtusa vel obtuse acuminata, basi haud prominenter glandulosa, anguste vel obtuse cuneata, margine distanter dentibus glandulosis crenato-serrata vel rare subintegra, supra glabra, infra praeter costam glabra, laxe reticulata, glanduloso-pustulata ; nervi laterales utrinque 8-11, arcuati, infra cum costa prominentes. *Paniculae* terminales et axillares, usque ad 22 cm. longae, ramis oblique adscendentibus infimis ad 18 cm. longis, fulvo-tomentosae vel pubescentes. *Flores* ♂ in ramis fasciculati ; bractae ovato-rotundatae, circiter 1 mm. diametro, extra tomentellae ; pedicelli 3-6 mm. longi, tenues, puberuli. *Calyx* 3-4-partitus ; segmenta subaequalia, circiter 2 mm. longa, ovata vel late ovata, membranacea, extra puberula, intus glabra. *Petala* irregulariter obovato-rotundata, 1 mm. diametro, tenuiter membranacea, glabra, margine inconspicue ciliolata. *Disci* glandulae 5, antheris sessilibus multo commutatis complanatisque similes, glabrae. *Stamina* 13-16, intra discum in receptaculo convexo leviter pubescente disposita, 2-3 mm. longa. *Nec flores* ♀ *nec fructus* visi.

WEST TROPICAL AFRICA. Gold Coast : Ashanti, Ofin Headwaters Reserve, *C. Vigne*, 1915, type, in Kew herb. and Imperial Forestry Institute herb., Oxford, with flowers April, 1930 ; Abofaw, *C. Vigne* 3135 ; Tano-Ofin Forest Reserve, *F. J. Lyon* 2862 ; Mampong Scarp, *C. Vigne* 2752 ; Southern Scarp Reserve, *Mrs. H. W. Moor* 1152 ; Bosusu, *Mrs. Moor* 345.

Variouly described as : "Small tree 15 ft. high" ; "Small tree 20 ft. high and 1 ft. girth, understorey in forest, white flowers" ; "Small tree, deciduous forest" ; "Small tree 25 ft. high and 2 ft. girth, understorey in forest" ; "Tree 50 ft., pale yellow flowers." Collected with flowers or flower-buds at various times from January to December, and with open flowers in December and April. Leaves said to be used as medicine (*Mrs. Moor*).

Vernacular names : " Dubrafo " (Ashanti and Twi) ; " Mpeoro " (Ashanti).

Dalbergia glandulosa Dunkley, sp. nov. [Papilionaceae] ; affinis *D. albiflorae* A. Chev. ex Hutch. et J. M. Dalz., sed inflorescentia multo brevior paullo ramulosa, stipulis conspicuis falcatis, ramulis junioribus glandulosis et fulvo-pubescentibus differt.

Frutex scandens ; partes juniores pilis fulvis atque glandulis instructae. *Petiolii* 1-1.5 cm., rhachides 4-8 cm. longae, dense fulvo-tomentosae demum pubescentes, glandulis persistentibus. *Stipulae* circiter 1 cm. longae, conspicue falcatae. *Folia* 7-9-foliolata ; foliola alternantia vel subopposita, petiolis 2 mm. longis, utrinque crebre reticulata, margine tomentoso-ciliata, supra tenuiter pubescentia, glabrescentia, infra sub-dense piloso-pubescentia, costa subtomentosa, nervis lateralibus utrinsecus 6-8 tenuibus arcuatis ; inferiora ovata, circiter 3 cm. longa et 2 cm. lata, basi rotundata, apice obtusa et conspicue mucronata ; superiora obovato-oblonga, usque ad 7 cm. longa et 3.75 cm. lata, apice rotundata vel retusa, apiculata, basi rotundata vel brevissime cuneata. *Paniculae* breves, axillares et terminales, 4-8 cm. longae, dense fulvo-pubescentes et glanduloso-pilosae, ramulis 2-4 usque ad 2 cm. longis ; bracteae et bracteolae subpersistentes, conspicue tomentellae, 2-3 mm. longae ; pedicelli brevissimi. *Calyx* 4 mm. longus, extra breviter rufo-tomentosus, intus glaber, dentibus ovato-acutis 1.5 mm. longis. *Petala* glabra, 7 mm. longa, longe unguiculata, unguibus 2 mm. longis ; vexillum orbiculatum, emarginatum, 5 mm. latum ; alae obovato-oblongae, basi truncatae vel leviter appendiculatae ; carina naviculariformis, 2.5 mm. longa. *Stamina* 10, in vaginam supra fissam connata. *Ovarium* pilosum, longe stipitatum, stigmatibus parvis. *Fructus* stipitatus, compressus, coriaceus, seminibus elevatis, usque ad 9 cm. longus et 2 cm. latus, lanceolatus vel oblongus, apice atque basi acutus, fulvo-tomentosus et valde glanduloso-pustulatus. *Semina* 1-2, biconvexa, reniformia, circiter 10 mm. longa, 5 mm. lata, 3 mm. crassa.

SOUTH TROPICAL AFRICA. Northern Rhodesia : Bombwe, J. D. Martin 161 (flowers), 687 (fruits), type, in Kew herb. and Imp. For. Inst. herb., Oxford, " woody, many-stemmed climber," coll. Dec., 21st., 1931 (flowers), April 1933 (fruits) ; Livingstone District, Siburu, D. Stevenson 1, " small tree " ; Sichifura, D. Stevenson 170. Southern Rhodesia ; Wankie, B. Levy 106, Flowers Dec. 1934, fruits Feb. 1935.

Vernacular names : " Mukonkoto " (Chitoka) ; " Muwunda " (Sikololo).

Pterocarpus Martinii Dunkley, sp. nov. [Papilionaceae] ; affinis *P. rotundifolio* (Sond.) Druce, sed staminibus longioribus, calycis tubo extra puberulo, fructu dense fulvo-tomentoso, foliolis pluribus plerumque minoribus satis distincta.

Arbor parva, trunco circiter 30 cm. diametro, ramulis incano-puberulis; petiolus 3.5 cm. longus, rhachis 11 cm., dense sericeus. *Folia* 11–13-foliolata, circiter 16 cm. longa; foliola opposita vel subopposita, oblongo-ovata vel suborbiculata, subcoriacea, basi rotundata, truncata vel brevissime cuneata, apice obtusa et retusa vel rarissime rotundata, 4–6 cm. longa, 3–5 cm. lata, supra pubescentia, infra dense griseo-sericea, costa prominente; nervi laterales utrinsecus 6–8; petioluli 5–7 mm. longi. *Paniculae* terminales, 15–20 cm. longae et latae, ramis patentibus dense pubescentibus. *Flores* 1.5 cm. longi. *Calyx* 7 mm. longus, extra pubescens, subpersistens, dentibus acutis, tubo intus glabro. *Petala* flava, vexillo 7.5 mm. lato. *Stamina* monadelphia, tubo 7 mm. longo. *Ovarium* dense sericeum, stipite 5 mm. longo; stylus glaber. *Fructus* submaturus, sicco pallide brunneus, irregulariter subfalcato-ellipticus, fulvo tomentosus, circiter 5 cm. longus, 3.5 cm. latus, stylo minute persistente subterminale, alis coriaceis. *Semina* 2, complanata, semi-elliptica, 6–7 mm. longa.

SOUTH TROPICAL AFRICA. Northern Rhodesia: Bombwe, J. D. Martin 524 (flowers), 563 (fruits), type, in Kew herb. and Imperial Forestry Institute herb., Oxford; leaves first collected in June 1932, galled flowers in December 1932, complete flowering and fruiting material collected from the same tree in Feb. 1933, "a small tree in mopane, S.W. forest boundary on Kalahari sand"; Mazabuka District, Pemba, on red sandy loams derived from mica schists, 4500 ft., March 1933, Trapnell 1186, "small tree to 35 ft. high; bark rough, furrowed." Southern Rhodesia: Lomagundi, 22 April 1929, Eyles 6334.

Vernacular name: "muLianzovu" (Chitoka).

Ekebergia velutina Dunkley, sp. nov. [Meliaceae]; affinis *E. benguelensi* Welw., a qua ovarii loculis 2-ovulatis, paniculis majoribus, rhachide et petiolo longioribus, foliolis dense sericeis, haud utrinque glabris, recedit.

Arbor mediocris; partes juveniles primum velutinae; ramuli mox glabrescentes. *Folia* imparipinnata, 15–18 cm. longa, petiolo 4–5 cm. longo complanato, rhachide 14–16 cm. longa, petiolulis circiter 4 mm. longis; foliola utrinsecus 4–5, opposita vel subopposita, 5–8 cm. longa, 2.5–3 cm. lata, oblonga vel ovato-oblonga, apice breviter apiculata, rotundata vel truncata vel obtusa, basi late cuneata vel rotundata, margine reflexo, supra olivaceo-viridia et breviter pubescentia, subtus molliter griseo velutina, costa utrinque subprominente, nervis lateralibus utrinsecus circiter 12. *Paniculae* usque ad 15 cm. longae, 6 cm. latae. *Flores* velutini. *Sepala* ovata, extra puberula, intus glabra, 2 mm. longa. *Petala* oblonga vel ovato-oblonga, puberula, 7 mm. longa. *Tubus stamineus* puberulus, 4 mm. longus. *Antherae* falcatae, glabrae. *Discus* obscure 5-lobatus. *Ovarium* triloculare; ovula in loculis 2. *Stylus* crassus, puberulus, 2 mm. longus. *Drupa* 1.5 cm. longa, 1 cm. diametro. *Semina* 1–2, reniformia, 8 mm. longa, 7 mm. lata.

SOUTH TROPICAL AFRICA. Nyasaland : Mlanje District, Tuchila Plain, *P. Topham* 910, type, in Kew herb. and Imperial Forestry Institute herb., Oxford ; "on well drained ground, uncommon" ; near the Likabula timber depot, Mlanje, *J. B. Clements* 125, Oct. 1929 ; Zomba, 2700–3000 ft., *J. M. Purves* 233, Nov. 1915. Northern Rhodesia : Lundazi, *D. Stevenson* 87, "medium tree," Sept. 1929.

Vernacular names : "Mututumuku" (Yao), "Musefu" (Chinsenga), "Mutumuko."

Diospyros Vaughaniae *Dunkley*, sp. nov. [Ebenaceae] ; affinis *mespiliformi* Hochst., a qua corolla glabra, staminibus 20, staminodiis pluribus, floribus et foliis minoribus, calyce fructus majore recedit.

Arbor parva, circiter 6 m. alta, alabastris, foliis juvenilibus, et fructibus immaturis viscosis ; ramuli glabri cortice lenticellato cinereo. *Folia* glabra, rigide coriacea, oblonga vel oblongo-orbiculata, 4–6 cm. longa, 3–4 cm. lata, apice rotundata vel obtusa, basi late cuneata, supra olivacea, subtus pallide brunneo-grisea, nervis lateralibus utrinque 8–10 supra parum impressis subtus cum costa subprominentibus, margine integra revoluta ; petiolus 4 mm. longus, supra canaliculatus. *Flores* sessiles, dioici, glutinosi, in axillis solitarii. *Calyx* coriaceus, urceolatus, extra minute furfuraceus, intus glaber, breviter 4-dentatus. *Corollae* tubus e calyce paulo exsertus ; *lobi* 4, contorti, glabri. *Flores* ♂ : stamina 20, per paria connata ; antherae lanceolatae, biloculares, basifixae, 2 mm. longae, poris apicalibus dehiscentes ; filamenta 0.5 mm. longa ; ovarii rudimentum minute pilosum. *Flores* ♀ : staminodia circiter 10 ; ovarium glabrum, 8-loculare ; ovula in loculis 1 ; stylus 4-furcatus. *Fructus* glaber, oblongo-ovoideus, 2.5 cm. longus, 1.5 cm. latus, breviter pedicellatus ; calyx fructu accrescens et hypocrateriformis, 2 cm. latus, tubo circiter 1 cm. longo. *Semina* 5, oblonga, 1.2 cm. longa, 4 mm. lata, testa coriacea.

EAST TROPICAL AFRICA. Zanzibar : *J. H. Vaughan* 699, type, in Kew herb., "tree with sticky buds and acorn-like fruits" ; *Vaughan* 1492, 1545, 1931 ; *Kirk*, s.n. ; Pwani Mchangani, *Greenway* 1198, "a tree 20 ft. high, spreading branches, fruits very sticky." Jan. 26th, 1929. Pembe Islet, off Pemba Island : in the xerophyte fringe above, or at high water mark, *Burtt Davy* 22455, 22576, "a low straggling tree, apparently unhealthy and out of its element," Oct. 11th, 1929. Kenya Colony : Witu, *St. Barbe Baker* 60.

The specimen collected on Pembe Islet was growing at the lower fringe of the xerophytic scrub on the sea-shore, almost at high-water mark, in an extremely hot locality, very dry except for the proximity of salt water. The pale colour of the leaves, and the tendency to curl under, in an irregular manner, gave the impression that the tree was unhealthy and growing out of its element. Mr. and Mrs. J. H. Vaughan have since found the species

in several places on the Zanzibar coast, where it is not uncommon in the "coral rag" country, though local in its distribution. They state that the irregularly revolute leaf-margins are characteristic of the species. The fruit seated in its persistent calyx forcibly recalls a young acorn in its cup.

J.B.D.

Strychnos bicirrifera Dunkley, sp. nov. [Loganiaceae]; affinis *S. matopensi* S. Moore, a qua calycis segmentis longioribus, stylo pubescente longiore, cirris geminatis circinnatis longe stipitatis, foliis basi rotundatis (haud cuneatis) differt.

Frutex scandens, cirris geminatis circinnatis, ramulis striatis cum petiolis et ramis floriferis molliter puberulis. *Folia* coriacea, circiter 4 cm. longa, 3 cm. lata, ovata vel latissime ovato-lanceolata, apice acuta, apiculata, basi rotundata vel breviter cordata, supra glabra, nitida, infra glabra sed in costa pubescentia, nervis 3 vel 5 arcuatis a basi orientibus et supra et subtus aequaliter prominentibus manifeste reticulatis, petiolo tumido crasso 2-3 mm. longo. *Cymae* axillares terminalesque, circiter 10-florae, bracteis geminatis deltoideis 1 mm. longis, pedicellis et pedunculis puberulis 4-6 mm. longis. *Flores* fragrantis, albi, in medio fusci, 4 mm. longi. *Sepala* 5, ovato-lanceolata, ciliata, 1.5 mm. longa. *Petala* 5, oblonga, acuta, 3-costata, extra glabra, intus ad basin longe pilosa, tubo brevissimo vix 1 mm. longo. *Stamina* 5, antheris basifixis inclusis. *Ovarium* minutum puberulum, 2-loculare. *Ovula* in loculis numerosa. *Stylus* 3 mm. longus, stigmatem integro. *Fructus* non visus.

EAST TROPICAL AFRICA. Kenya Colony: Malindi District, Arabuko, R. M. Graham 2290, type, in Kew herb. and Imperial Forestry Institute herb., Oxford, with flowers, March 1930, "scandent shrub forming part of the undergrowth in *Brachystegia* forest. Flowers, white with a blackish centre, strongly scented of nutmeg. Leaves abundant, causing dense patches of vegetation in which a puff-adder [Bafe] might be expected to live." Arabuko, R. M. Graham 1854, "part of bushy secondary growth after forest has been cut down."

Vernacular name: "mbugu-bafe" (Swa.).

Belonophora coriacea Hoyle, sp. nov. [Rubiaceae-Albertaeae]; affinis *B. lepidopodae* Hutch. et J. M. Dalz., a qua stipulis latioribus nec subulato-acuminatis, bracteis et calyce majoribus, foliis, bracteis et floribus coriaceis, foliis ellipticis recedit.

Arbor (?) riparia, praeter inflorescentiam glabra, ramulis novellis primum viridi-cinereis striatis, nodis complanatis, in ramis annuatis cortice cinereo vel pallide fulvo-cinereo nodis tumidis. *Stipulae* 1-1.5 cm. longae, 2-5 mm. latae, coriaceae, oblongo-lanceolatae vel ellipticae, obtusae, variabiles. *Folia* coriacea, elliptica vel lanceolato- vel oblongo-elliptica, 10-27 cm. longa, 3.5-10 cm. lata, apice breviter acuminata, basi cuneata et in petiolo decurrentia, costa et nervis utrinque prominulis venis inconspicuis; nervi laterales

utrinque 5-6. *Flores* solitarii vel fasciculati, axillares vel in axillis foliorum delapsorum, subsessiles; pedicelli bracteosi, circiter 1 mm. longi; bracteae coriaceae, orbiculares, 2-2.5 mm. diametro, in sicco longitudinaliter striatae, ciliatae, fructu persistentes et paulo accrescentes. *Calyx* alte 5-lobatus, fructu accrescens; lobi 5, bracteis similes, valde imbricati, ciliati; tubus 1 mm. longus, ovario haud superans, extra irregulariter tomentosus. *Corollae* tubus in alabastro 12-13 mm. longus, 2.5 mm. latus, extra puberulus; lobi 5, 10 mm. longi, 3-5 mm. lati, oblongi, obtusi, extra puberuli, intus glabri, ciliati. *Antherae* lineares, 6 mm. longae, sessiles, medifixae 3 mm. infra ore corollae, connectivo deltoideo. *Discus* magnus, depresso-globosus, ater. *Ovarium* biloculare; ovula pro loculo 1, pendula; stylus 6 mm. longus, ramis 2 in alabastro contortis. *Fructus* baccatus, globosus, subcoriaceus, sparse pubescens, circiter 1.5 cm. diametro, calycis lobis late deltoideis in annulo lato sub apice dispositis. *Semina* 1 vel 2, plano-convexa, rotundata, brunneo-sanguinea, rugulosa, 8-10 mm. diametro.

WEST TROPICAL AFRICA. Nigeria: Mamu River, J. D. Kennedy 2542, type, in Kew herb. and Imperial Forestry Institute herb., Oxford, with flowers and fruits; Sapoba (Jamieson River) Kennedy 2279 with fruits, 1852 with flowers and young fruits.

Vernacular name: (Yoruba?) "Igbakue izigha."

Sabicea rosea Hoyle, sp. nov. [Rubiaceae-Mussaendeae]; a *S. cordata* Hutch. et J. M. Dalz. calycis lobis brevioribus haud subulatis, foliis basi cuneatis; a *S. bracteolata* Wernh. floribus longioribus piloso-hirsutis, calycis lobis latioribus obtusioribus, calyce et ramulis sparse pubescentibus, recedit.

Frutex scandens, tenuis; ramuli novelli brunnei, teretes, leviter striati, pilis adpressis nonnullis reflexis setuloso-pubescentes. *Stipulae* 4 mm. longae, deltoideae, acutae vel breviter acuminatae, adpresso-puberulae, deciduae. *Petoli* tenues, 1-3 cm. longi, latere superiore densissime, latere inferiore sparse setulosi. *Folia* chartacea, elliptica vel rare obovata, 5-9 cm. longa, 3-4.5 cm. lata, apice breviter acuminata vel acuta, basi cuneata, margine ciliata, supra atro-viridia et sparse setulosa, costa dense setulosa, subtus pallidiora costa nervisque fuscis, praecipue in costa et nervis setulosa, tenuissime reticulata; nervi laterales utrinque 9-12, valde arcuati, prope marginem crebre conjuncti. *Cymae* 1-4-florae, sessiles, axillares in ramulis novellis foliatis vel annotinis nudis; bracteolae parvae, ovatae, puberulae, ovarii basin amplexantes. *Flores* sessiles. *Calycis* tubus praeter ovarium 1 mm. longus, breviter turbinatus; lobi virides, herbacei, 2.5 mm. longi, ovati, acuti, extra puberuli, ciliati. *Corolla* puniceo-brunnea, fusco-maculata; tubus 2 cm. longus, basi tenuis, dimidio superiore dilatatus, extra pilis roseis patentibus dense hirsutus sed basi glaber, intus infra ore pilosus; lobi 5, deltoideo-ovati, acuti, 3 mm. longi, extra brunneo-hirsuti, intus glabri. *Antherae* lineari-oblongae, sagittatae, 2.5 mm. longae, in ore corollae sessiles et partim exsertae. *Ovarium* turbi-

natum, 2 mm. longum, obtuse adpresso-puberulum, 5-loculare, ovulis numerosis. *Stylus* lobis exceptis 17 mm. longus, inclusus; lobi 4 (vel 5 ?) filiformes, 2 mm. longi, stigmatibus lineari-oblongis complanatis 1 mm. longis. *Fructus* non visus.

WEST TROPICAL AFRICA. Gold Coast: Western Province, Boinsu, 300 ft. altitude, *C. Vigne* 3190, type, in Kew herb. and Imperial Forestry Institute herb., Oxford, with flowers December 1933, "red-flowered climbing shrub in forest."

XXIII—THE NATIONAL PINETUM AT BEDGEBURY AND ITS ORIGIN.

In 1922 informal conversations, which had been in progress for some years, led to definite proposals for the establishment of a new National Pinetum to replace the Conifer Collection at Kew, as this was rapidly deteriorating through the combined influences of poor, dry soil and increasing atmospheric impurities.

Hitherto, the initial cost of such an undertaking had prevented progress, and the question had not been submitted for official departmental consideration. However, with the advent of the Forestry Commission and the acquisition of land for afforestation, interested officials, amongst whom Sir John Stirling-Maxwell, Bart., K.T., was prominent, suggested that it might be possible and of mutual advantage to Kew and to the Forestry Commission, to set aside an area of Forestry Commission land whereon a National Pinetum could be formed.

In order to place the suggestion upon an official foundation a letter dated May 18th, 1922, was written by Mr. Roy (now Sir R. L.) Robinson of the Forestry Commission to Dr. (now Sir Arthur) Hill, as follows:—"I understand indirectly that you have been considering the desirability of finding a site for an Arboretum away from Kew, which is unsuitable for many coniferous species. Perhaps we could help in this respect, as we now have estates all over the country and could spare the relatively small area which would be required for the purpose." The letter was followed by a discussion on possible sites, and in May 1923 several positions in Surrey, near Churt and Bramshill, were examined. They were not regarded as being altogether suitable, and further correspondence led to a suggestion from the Forestry Commission that a visit should be paid to Bedgebury Park, an estate in Kent that belonged to the Office of Crown Lands, the woodlands of which, it was expected, would shortly be transferred to the Forestry Commission. A preliminary examination led to a favourable impression being formed of the possibilities of a site on the estate, and a subsequent more careful survey of several positions confirmed the first impression that the ground was eminently suitable for the cultivation of most kinds of conifers.

Eventually an area of about 50 acres was selected on the Goudhurst side of the estate immediately around Park House, the residence of the estate gamekeeper, about 4 miles from Goudhurst and 12 miles from Tunbridge Wells. This area was made up of undulating ground rising about 70 feet from the lowest point, Marshall's Lake, a pleasant sheet of water on the boundary, backed by a decorative plantation of mixed conifers of considerable size with *Rhododendron ponticum* as undergrowth. The crops on the ground consisted partly of good mature Scots pine about 120 years old, partly of Chestnut coppice with Oak, Holly and ornamental conifers as standards, two small areas of young larch plantations, one Japanese the other European, a corner of a mixed plantation of Douglas fir and other species, and several acres of wet ground carrying thin birch and alder coppice.

The ground generally was good, varying from deep loam to shallow loam over a hard pan covering reasonably good soil of a light clayey nature. In other places a thin layer of peat covered a hard pan of sandy clay which on exposure broke up into reasonably good soil. There were numerous springs about the area and at one time the ground had been well drained, but many years of neglect had resulted in open ditches being filled in with decaying vegetable matter and pipe-drains becoming hopelessly disorganised. However, growing amongst the oak coppice were numerous conifers 60-100 feet high, such as *Abies grandis*, *A. nobilis*, *Pseudotsuga Douglasii*, *Sequoia gigantea*, *S. sempervirens*, *Tsuga heterophylla*, *Picea sitchensis*, etc., all in excellent health, which denoted the general suitability of the land.

Steps were then taken to obtain the approval of the Ministry of Agriculture and Fisheries for the project, and the sanction of the Treasury for the funds required for maintenance. As very strict national economy was necessary at the time, the Forestry Commission and Kew arranged to carry out as much as possible of the preliminary work of ground preparation, provision of plants and planting, without any addition to their 1924-25 grants. Thus the Forestry Commission agreed to fell the trees and coppice-wood, dispose of the timber, fence the ground, and provide labour for planting; Kew to provide the plants, supervise planting, and take all responsibility for listing, labelling and generally looking after the growing trees. After this work was done maintenance for the first few years was estimated at £100 a year, the expenses being divided on a 50 per cent. basis between the Forestry Commission and the Ministry of Agriculture and Fisheries.

Unfortunately the work could not be pushed on as rapidly as had been hoped, and by the middle of March, 1925, less than one fifth of the area was available for planting, and that was littered with tree-trunks and cord-wood.

Certain plants had been ordered and had to be paid for before the end of the financial year, many were ready for removal from the

nursery at Kew, and others had been presented by Lord Wakehurst (then Mr. G. W. E. Loder) and Mr. F. R. S. Balfour. Planting, therefore, had to be undertaken with the timber lying on the ground, which in some cases prevented the allocation of ground to the best advantage. Species of *Abies*, *Larix*, *Tsuga*, *Thuja*, *Cunninghamia* and *Pseudotsuga* were put in at that time, but the greater part of the planting had to be postponed until the following autumn. As it was impossible to fence before the ground was cleared, every plant put out in March, 1925, had to be encircled by wire netting. Unfortunately as summer advanced it was found that the rest of the ground could not be cleared for planting during the autumn of 1925, and work was still further delayed by a very wet winter. Throughout the winter, heavy timber was being carried over badly bottomed roads and they became deeply rutted and covered by several inches of sloppy mud. Planting was carried out in February, 1926, and there was rain every day during the first three weeks. There was still a good deal of timber lying about, and where it had been hauled the ground was deep in mud. Planting could not be deferred since the work had to be done before the end of the financial year. As the roads were so bad all plants had to be dumped some distance from the places they were to occupy. The roots of many were balled and weighed anything from two or three to more than twenty pounds. They had to be carried from 200 yards to over a quarter of a mile and there were over 700 of them. The journey in some cases meant crossing several ditches and two or three roads covered deep in mud. In some instances holes dug for plants became filled with water and had to be baled out before planting could be done. This is one of the disadvantages of being compelled to work to a timetable. Had it been possible to retain the available money and postpone planting until the following autumn, it would have been better for all concerned, but that could not be done. Provision had been made for that financial year but not for the one following.

As it was, difficulties arose over the postponement of the fencing. When it was done there was no money available, and in the end it was necessary to go to the Treasury for an increased grant, which was ultimately obtained. The annual grant for labour and all other commitments was eventually raised to £300, which was maintained until the financial year 1934-35 was reached. Then, as other obligations arose, the grant was raised to £450.

On February 1st, 1924, a meeting was held between Mr. Bean of Kew, and the late Mr. Pritchard and Dr. Borthwick of the Forestry Commission, for the purpose of discussing preliminary arrangements and making suggestions for future management. Amongst other items the possible acquisition of Park House was discussed and the following paragraph occurs in the report of the meeting. "It is understood that if Park House becomes a dwelling for a forester, a room would be available where books and other information could be consulted and studied by those interested in

the subject." Although the necessity for such a room was frequently urged, it was not until 1933 that the house became available for a Forestry Commission Forester and it was then possible to allocate accommodation for the work of the Pinetum Committee. In the meantime the only shelter available was a small tool-shed.

Although much of the earlier planting was carried out under such unfavourable conditions the young trees grew well and would have succeeded much better than they did had it not been for severe May frosts in 1926, 1927, and 1928, which cut the young shoots of many species of *Abies*, *Picea*, and *Tsuga* hard back. Some recovered during 1929 but others had to be replaced. There was also a good deal of harm done by pine-weevils (*Hylobius abietis*) to young pines, by species of *Dreyfusia* to *Abies* and by green spruce-aphis to *Piceas*. Pine-weevil disappeared after the first three years but, despite regular spraying, the other two pests have continued with more or less virulence up to the present time. The pests are apparently constantly spread to small trees from large trees in the vicinity. Several other pests and diseases have also caused trouble, but such difficulties are to be expected when planting is carried out in old forest land. Honey fungus (*Armillaria mellea*) has killed a number of fine young trees, and several five-leaved pines were killed by *Cronartium ribicolum*.

On the other hand, although larch-canker fungus (*Dasyscypha calycina*) is prevalent in a plantation 200 yards away from where the larches are growing, only a few small patches of this disease have been noted on the young trees. Apparently well-worked ground and wide spacing had a beneficial effect.

Whenever possible six plants of a species and three of a variety have been planted. All large-growing kinds were spaced 20 to 24 feet apart and so arranged that one or two could be cut out at some future date if necessary. Holes were made 3 feet across, and 1½ feet deep with the bottom dug up. For the first five or six years open circles were maintained round each tree, but as the trees acquired strength and size cleaning has been reduced until now the larger ones are left to take care of themselves.

It was soon found that the old drains would have to be opened and new ones made to prevent some parts of the ground becoming too wet, for a few of the larger trees were deteriorating through wet ground. Draining and the erection or repair of rustic bridges created a good deal of work. Much cutting out of overgrown rhododendrons, of dead branches from large trees, and of young shoots from coppice stools has had to be undertaken.

From the start records have been kept of all plants, and every plant has been labelled with its name, country of origin and index number. Additions to the number planted in 1925-26 have been made each year since, and besides conifers a number of broad-leaved trees and shrubs have been planted in the vicinity of Park House. A large number of evergreen species and varieties of *Rhododendron* have been planted between the conifers, and an effort is

being made to establish deciduous rhododendrons over a considerable area of ground, for the combined purpose of checking ground-vegetation that is easily fired in dry weather and of providing a display of flowers at little or no cost. In other parts masses of mountain pine are being formed to take the place of grass and bracken. Surplus water-lilies were taken from Kew and planted in Marshall's Lake, and these, during 1933 and 1934, flowered remarkably well and created considerable interest in the neighbourhood.

A good deal of natural regeneration of trees has gone on since the crop was cut in 1924 and 1925. Large numbers of Scots pine, Lawson cypress, Sitka spruce, Douglas fir, holly, *Abies grandis*, *Thuja plicata* and other species have appeared from naturally sown seed, and provision has been made for the retention of many of these interesting seedlings.

Some of the small trees planted in 1925 and 1926 are now over 20 feet high, and the problem arose two or three years ago as to whether those that eventually grow into large trees should be pruned to form a definite length of clean trunk, or whether they should be allowed to retain their branches to the ground line. A decision was made in favour of pruning, and species of larch, the larger-growing pines, Douglas firs, etc. are being pruned, the idea being to obtain a length of about 12 feet of clean trunk while the diameter is small, and then to allow the branches to develop naturally. Where the branches are unlikely to droop low enough for the branchlets to be handled from the ground, the branches of one or more trees of that species will be left lower on the trunk for purposes of close examination.

The land immediately around Park House, when transferred with the house in 1933, was in a derelict state and very untidy, with large masses of nettles, docks and other coarse weeds. This has been cleaned up, several old trees removed and others cleared of dead wood. Numerous trees and shrubs have been planted, a new entrance to the Pinetum made, and an area of level ground sown with grass seed. Rooms in Park House given over for the work of the Pinetum have been repaired, redecorated and furnished, and herbarium cabinets have been installed. A nucleus of a conifer herbarium and library has been formed. Several dilapidated sheds have been repaired for use as tool-sheds and a messroom for men working in the Pinetum and adjacent forest.

The accompanying plan gives an idea of the lay-out of the ground with the placing of the different genera. Several avenues have been arranged for the convenience of visitors. No attempt will be made to keep these avenues closely mown. Heather and ling are encouraged to grow and the whole arboretum will be developed in a natural or informal manner, tracks being cleared to the various genera during summer, general mowing being carried out once or twice a year.

Unfortunately a violent storm occurred on November 16th, 1928, which blew down 30 of the finest specimen trees, many of them



Plan of the National Pinetum at Bedgebury.

70 to 90 feet high, and injured others. They grew where the water table was high and their roots had spread over a wide area but were usually less than 15 inches deep. The dry years of 1933-1934 have not injured any of the young trees although practically all the springs, drains; and water-courses dried up. Although only about 55 miles from Kew the 1934 rainfall at Bedgebury was double that experienced at Kew.

Low ground at Bedgebury is subject to frost, and not infrequently 4 or 5 more degrees of frost are experienced in low places than on higher ground 200 yards away.

Near the Pinetum, the Forestry Commission have established 40 acres of experimental forest plots laid out chiefly in quarter-acre sections. These contain species not usually planted under forest conditions and various races for comparison with well-known forest trees.

Visitors who are genuinely interested in conifers and other trees are welcomed in the Pinetum at Bedgebury, but they are asked to respect the few restrictions placed upon visitors as given on the

notice boards. Should they wish for information they should approach the Keeper, Mr. W. Castle, at Bedgebury, or write to the Director, Royal Botanic Gardens, Kew. The Forester, Mr. Nelmes, living in Park House, and the Keeper have authority to act in the event of persons disobeying regulations, or acting in any way that is likely to be detrimental to the interests of the Pinetum.

XXIV—TROPICAL AFRICAN PLANTS: XIII.*

Triplochiton zambesiacus *Milne-Redhead*, sp. nov. [Sterculiaceae]; a *T. scleroxylo* K. Schum. inflorescentiis paucifloris, bracteolis sub anthesin persistentibus, floribus majoribus, androgynophoro pro rata longiore, staminibus numerosissimis valde distincta. Masters in Oliv. Fl. Trop. Afr. 1, 239 (1868), sine nomine.

Arbor usque 18 m. alta e basi furcata, ligno ignoto. *Ramuli* graciles, teretes, glabri. *Folia* decidua, vel fere sempervirentia, palmatim 5-9-lobata, cordata, petiolata; lamina usque 12 cm. longa et 14 cm. lata, lobis ovatis vel oblongis breviter acuminatis subacutis, basi ad venas pilis stellatis densiuscule induta, ceterum glabra; folia immatura sparse stellato-hirsuta; petioli usque 4 cm. longi, sparse stellato-hirsuti, demum glabri; stipulae mox deciduae. *Inflorescentiae* 1-4-florae, axillares vel terminales; pedicelli usque 1.5 cm. longi, sparse stellato-hirsuti; bracteae deciduae, ovatae, obtusae, concavae, usque 8 mm. longae, sparse stellato-hirsutae; bracteolae 3, late ovatae, sessiles, infra calycem involucrum formantes, sub anthesin persistentes. *Calyx* late infundibuliformis, circiter 2 cm. longus, lobis 5 deltoideis acutis circiter 8 mm. longis et 7 mm. latis, extra pilis stellatis dense tomentosus, intus velutinus. *Petala* 5, plus minusve late obovata, leviter concava, apice rotundata vel subemarginata, basi conspicue unguiculata, circiter 3.5 cm. longa et 2.5 cm. lata, appendicibus basi laminae circiter 1 mm. longis inconspicuis, utrinque pubescentia, ungue glabro, intus supra unguem densissime hirsuta. *Discus* annularis, valde inconspicuus. *Androgynophorum* cylindricum, leviter angulatum, 9 mm. longum, 3 mm. diametro, superne dense adpresse hirsutum, inferne glabrum. *Stamina* numerosissima (circiter 95); filamenta 6-8 mm. longa, per paria vel ternatim inferne coalita; antherae usque 2 mm. longae. *Staminodia* 5, aestivatione contorta, ovata, profunde concava, circiter 6 mm. longa, 4 mm. lata, scariosa, glabra. *Ovarium* ovoideum, 5-angulatum, circiter 5 mm. longum, dense hirsutum; stylus 2 mm. longus, pubescens; ovula 10-12 per loculum, biseriatim disposita. *Fructus* samaroideus, unilateraliter alatus, 2 cm. longus ala exclusa, densissime tomentoso-hirsutus, 1-spermus;

* Continued from K.B. 1934, 307.

ala obovoideo-oblonga, usque 7 cm. longa et 2.8 cm. lata; calyx et staminodia reflexa sub fructu persistentia, apice androgynophori densissime tomentoso-hirsuto.

SOUTHERN RHODESIA. Wankie District: Wankie, 750 m., March (fruit), Eyles 6960. Common around Wankie, Dec. 1934 (flowers), Eyles 8295 (type):—wood used for making yokes. Native name *Muzonzo*. Wankie, Feb. 1933 (flowers and fruit), Kelly Edwards 23/33 (Herb. Imp. For. Inst.). Wankie, Jan. 1933 (flowers), Levy 80 (Herb. Transv. Mus. no. 31116). Wankie, 8 July 1929 (fruit), Bremekamp s.n. (Herb. Transv. Mus. no. 27501).

NORTHERN RHODESIA. Mazabuka District? Country between the Kafue and the Batoka highlands, Zambezi Valley, July 1860, Kirk s.n.:—a tree of moderate size. On ant hills, fertile loams or sandy loams, on the fringes of Mopane country in Gwembe (Zambezi) Valley, 450 m., 1932, Macrae 5:—a 12 m. high sycamore-like tree with whitish bark, forked from the base, or growing with several stems together; leaves cooked as spinach by natives. Chitonga name *Mukunzu* or *Mukonza*. A big tree at Bagassa's Camp, Zambezi River Valley, Jan. 1930 (flowers), Browne 45/30 (Herb. Imp. For. Inst.):—native name *Mukonza*.

The genus *Triplochiton* was founded on a specimen collected in the Cameroons by Zenker and Staudt (no. 595) described as *T. scleroxylon* K. Schum. Three species, all from the West African forests, have since been described. *T. Johnsoni* C. H. Wright has been reduced to *T. scleroxylon*, whilst *T. nigericus* Sprague appears to the writer to be doubtfully distinct in the light of material recently collected by Kennedy in Southern Nigeria. *T. utilis* Sprague, described from fruiting material, is now referred by its author to *Tarrietia*.

Although a fruiting specimen of *T. zambesiacus* was collected by Sir John Kirk as long ago as 1860, and was described by Masters in the Flora of Tropical Africa as a probable member of the *Sterculiaceae*, it is only recently, through the co-operation of Mr. Eyles, that flowering material has been received at Kew, making possible the identification of this tree as a species of *Triplochiton*. The species here described extends the range of the genus very considerably.

Hibiscus Mastersianus Hiern in Cat. Afr. Pl. Welw. 1, 71 (1896) [Malvaceae]. *H. furcatus* Mast. in Oliv. Fl. Trop. Afr. 1, 201 (1868) pro parte, non Roxb. *H. pachmarhicus* Haines in Bull. Misc. Inform. Kew 1914, 24 (1914). *H. surratensis* L. var. *Mastersianus* (Hiern) Hochr. in Ann. Conserv. & Jard. Bot. Genève, 4, 112 (1900).

Hiern, when enumerating the species of *Hibiscus* collected by Welwitsch, found that the specimens cited under the name *H. furcatus* in the Flora of Tropical Africa (l.c.) were specifically distinct from the Indian plant, *H. furcatus* Roxb., and accordingly

proposed a new name for the African plant, which he published as *H. Mastersianus* in the Welwitsch Catalogue (l.c.), at the same time referring three of Welwitsch's specimens to this species. Hiern did not publish a description of *H. Mastersianus*.

Only two specimens are cited by Masters—"Gambia, Ingram and Zambesi, Tette, Kirk," and one of these must be taken as the type specimen of *H. Mastersianus* Hiern. These two specimens represent different species, the former, which is a leafy specimen in bud, is undoubtedly the common West African *H. rostellatus* Guill. et Perr., and does not agree well with the description. On account of its being in bud, the key characters of the relative lengths of peduncle to petiole and bracts to calyx are unreliable and the specimen falls into "*furcatus*" if Masters' key is used. The description is based almost entirely on the Kirk specimen, mature calyces and capsules not being present on Ingram's sheet. The "coarse bristly hairs or even tubercles" on the nerves of the leaves, and the linear-subulate, hispid, stipules are characters taken from *H. rostellatus*, and the description of the lobing of the leaves, whilst more or less applicable to both species, is probably taken from the Gambia plant. The other characters given are those of Kirk's specimen, the "very short peduncles" being the one of greatest importance, as it is by this character that *H. Mastersianus* is most easily distinguished from *H. furcatus* Roxb. The Kirk specimen is accordingly considered to be the type specimen of *H. Mastersianus* Hiern.

In 1914 Haines (l.c.) described a species of *Hibiscus* from the Central Provinces of India, which was said to be allied to *H. furcatus* Roxb., *H. radiatus* Willd., and *H. Mastersianus* Hiern. In his remarks following his description, he says "*H. Mastersianus* was founded on Dr. Welwitsch's sheets Nos. 4927, 4928 and 5242." This statement as will be seen from the above, is incorrect, as the Welwitsch specimens are only cited under *H. Mastersianus* by Hiern, who thought them to belong to that species, and they are not types. Haines does not appear to have seen the Kirk specimen, which is indistinguishable from his Indian *H. pachmarhicus*, but he saw Rogers 7007 from Northern Rhodesia, and agreed that it might be the same species. Further excellent material collected in Northern Rhodesia by Trapnell and in Tanganyika Territory by Burt agrees very well with *H. Mastersianus*. The Angolan specimens mentioned above, whilst very closely related, appear to me to be distinct from *H. Mastersianus* and may require a new name and description.

INDIA. Central Provinces: common in the middle Gondwana sandstones about Pachmarhi in the Satpura range, 900 m., Oct. 1911, Haines 197 P.

TANGANYIKA TERRITORY. Kondo District: common in old cultivation and on waste land at Sambala, 1470 m., 28 March, 1929, Burt 2152; herb 1·2 m. high with yellow flowers. Manyoni District: in great "Higi-thicket" at Kazikazi, especially in glades of old

cultivation or after fire in the thicket, 1260 m., 14 May, 1932, *Burt* 3560 : plant dwarfed in shade, but 2 m. high in open ; flowers canary-yellow with sienna-red centre ; plant covered with irritating hairs causing severe rash wherever in contact with skin. Shinyanga District : common in shade of *Ostryoderris* and *Albizia* and other trees at Huru Huru, 1080 m., 17 May, 1931, *Burt* 2454 : a yellow-flowered herb.

PORTUGUESE EAST AFRICA. Lupata, 20 April, 1860, *Kirk* s.n. (type).

NORTHERN RHODESIA. Livingstone District : Livingstone and common all along the railway, April 1909, *Rogers* 7007. Namwala District : in clearings in dense *Baikiaea* forest at Namwala, April 1934, *Trapnell* 1437 : a herb 1·2 m. high. Mazabuka District : in *Commiphora*—*Combretum* scrub in Gwembe (Zambezi) Valley, 450 m., March 1934, *Trapnell* 1406 : a herb 1·2 m. high with yellow flowers.

E.M.—R. *Monadenium succulentum* Schweickhardt, sp. nov. [Euphorbiaceae] ; affinis *M. Guentheri* Pax sed foliis maioribus et phyllopodiis espinosis differt.

Planta succulenta, ramosa, perennis. *Rami* plus minusve 20 cm. longi et 1·5–2 cm. crassi, cylindrici, carnosi, glabri, virides, tessellati, in partibus vetustioribus fusci et sublignosi, phyllopodiis inferioribus espinosis usque ad 2 cm. longis et 1 cm. latis, apicem ramorum versus 7 mm. longis et 1 cm. latis. *Folia* apice ramorum laxe rosulata, usque ad 4·5 cm. longa et 1 cm. lata, apice ramorum gradatim decrescentia, oblarceolata, carnosa, glabra, intense viridia, acuta, pagina superiore concava et nervis intermediis prominentibus, pagina inferiore convexa et obtuse carinata. *Stipulae* minutissimae, rudimentariae. *Cyma* circiter 9 mm. longa et 1·5 cm. lata, axillaris, 3–7 cyathia gerens ; pedunculus 3–6 mm. longus, crassus ; rami cymae pedunculo multo breviores ; prophyllum cyathii obliquum, 5–6 mm. longum et 9 mm. latum, apice valde bifidum, bicarinatum, apertum, glabrum, glaucum, viride, margine pallide purpureum. *Cyathium* prophyllum aequans vel excedens, 6–7 mm. longum, cupuliforme, latere anteriore usque dimidium aperto, lobos interiores subquadratos fimbriato-denticulatos superans, glabrum, extra viride, margine paullo incrassato crenato et rubro-pululo. *Ovarium* exsertum et reflexum, papillatum, viride, maculis purpureis irregulariter suffusum, 4 mm. longum et 3 mm. latum, 3-angulatum ; anguli alis binis obscuris papillatis obsiti ; perianthium basi ovarii 3-lobatum ; lobi perianthii deltoidei. *Styli* triente inferiore connati, apice bilobati ; stigma obtusum et paullo incrassatum. *Capsula* et semina ignota.

KENYA COLONY. Laikipia, Ngobit River, *H. M. Gardner* 1478 in Herb. Kew., "a succulent plant growing in close cushions in dry hot rocky areas." Without exact locality, comm. *A. W. Hill* and flowered in Hort. Bot. Reg. Kew (type).

Crotalaria (Eucrotalaria) lotiformis Milne-Redhead, sp. nov. [Papilionaceae]; a *C. molli* E. Mey. foliis acutis supra villosis, pilis pedunculi et calycis subadpressis, stipulis falcatis persistentibus, carina vix rostrata facile distinguenda.

Herba perennis, rhizomate gracili repente. *Caules* pauci, haud caespitosi, erecti vel decumbentes, leviter ramosi, villosi, 5–15 cm. longi, demum longiores, foliosi, internodiis inferne circiter 3 mm. superne usque 2·5 cm. longis. *Folia* petiolata, trifoliolata, stipulata, stipulis leviter falcatis erectis usque 1 cm. longis basi circiter 1 mm. latis supra glabris subtus parce villosis persistentibus; petioli adscendentes, usque 7 mm. longi, 1 mm. diametro, supra leviter sulcati, villosi; foliola sessilia, oblanceolata, apice acuta, recurvata, basi attenuata, usque 3·5 cm. longa et 1 cm. lata, utrinque longe et adpresse villosa, praesertim pagina inferiore; nervi supra inconspicui, subtus prominentes, dense villosi. *Inflorescentiae* terminales, racemosae, 1–5-florae; pedunculi 1–5 cm. longi, leviter et adpresse, villosi; bracteae lineari-subulatae, usque 3 mm. longae, supra glabrae, subtus adpresse villosae; pedicelli adscendentes, 3–7 mm. longi, breviter et adpresse villosi. *Calyx* 5-dentatus, extra villosus, intus glaber; tubus circiter 2 mm. longus; dentes lanceolati, acuti, 4·5 mm. longi, basi circiter 2 mm. lati. *Vexillum* suborbiculare, circiter 1·2 cm. diametro, apice minute apiculatum, basi unguiculatum, ungue 2 mm. longo reflexo, callis basalibus vix 1 mm. longis acutis instructum, luteum, purpureo-lineatum; alae obovato-oblongae, circiter 1·1 cm. longae, superne 4·5 mm. latae, basi unguiculatae, ungue 2 mm. longo obliquo, luteae; carina dorso rotundata, apice acuta vix rostrata, inferne leviter auriculata, basi unguiculata, ungue 2 mm. longo, circiter 1·1 cm. longa, medium versus 5 mm. lata, lutea, purpureo-lineata. *Stamina* breviora antheris 2·6 mm. longis, longiora antheris circiter 1 mm. longis praedita. *Ovarium* oblongum, compressum, breviter stipitatum, circiter 5 mm. longum, sutura et apice barbatum, lateribus glabrum, multi-ovulatum. *Legumen* immaturum oblongo-cylindricum, sessile, circiter 1·5 cm. longum et 5 mm. diametro, velutinum.

KENYA COLONY. Masai Province. On hillsides in thorn-bush country at Ngong, 1800–2100 m., May 1934, *Napier* 3241 (Coryndon Museum no. 6304) (type):—a dwarf erect herb, about 1 dm. high; leaves with silvery tomentum; flowers yellow and red-brown or plain yellow, most flowers showing darker striations. On dry rocky ground at Kedong escarpment about 19 Km. south of Ngong hills, overlooking Lake Magadi in the distance, 2100 m., without date, *Napier* 1497:—base woody, leaves covered with silvery tomentum; flowers yellow striated at the base with maroon; keel shaded with maroon. In *Themeda triandra* grassland on black cotton soil at Ngong, 1800 m., 25 November 1930, *Edwards* 1490.

This very distinct species appears to have no close relative in Tropical Africa. In certain respects it approaches *Crotalaria mollis* E. Mey. from South Africa, but it is hard to say whether these species have any real affinity, as the present classification

of the African species is rather artificial. The flowers of *C. lotiformis* are similar in shape to those of *C. intermedia* Kotschy, but are smaller. The inflorescences are leaf-opposed, as the shoot from the axil of the uppermost leaf has often grown out to exceed the inflorescence by the time of flowering.



Crotalaria lotiformis Milne-Redhead. 1, plant in flower, *nat. size* ; 2, vexillum, with claw bent forwards, from within, $\times 2$; 3, ala, from without, $\times 2$; 4, carina, $\times 2$; 5, androecium opened out, posterior view, $\times 2$; 6, calyx and gynoecium, $\times 2$; 7, gynoecium, $\times 2$; 8, legume, slightly immature, *nat. size*.

Running underground, *C. lotiformis* produces numerous leafy and flowering shoots varying in height from 3 cm. upwards, even the smallest bearing at least one flower. In the dried state the species is reminiscent of a *Lotus*.

Eriosema (Eueriosema) flexuosum Staner, sp. nov. [Papilionaceae]; ab affini *E. cordifolio* Hochst. ex A. Rich. foliis superne glabris, pedunculo valde majore, floribus majoribus vexillo glanduloso pubescentequae sat distincta.

Suffrutex e radice napiforme ortus, sarmentosus, ramosus, pilis fulvis patentibusque dense obtectus. *Folia* unifoliolata, subsessilia, petiolo 1-2 mm. longo et pilis fulvis oblecto; lamina ovata, basin versus valde cordata, lobis amplexicaulibus, apice acuta, 3-6 cm. longa et 2-4 cm. lata, supra glaberrima, subtus in nervis pubescens et inter nervos glandulosa, nervis lateralibus 7-8 utrinsecus mediani; *stipulae* lanceolatae, apice subulatae, 5-6 mm. longae et 2 mm. latae, striatae, extra pilis fulvis oblectae, intus glabrae. *Inflorescentiae* racemosae, axillares vel terminales, pedunculatae, pedunculis flexuosis, 5-10 cm. longis, pilis fulvis patentibusque dense ornatae, racemis laxis plurifloris 2-3 cm. longis; bractae subulatae, 4 mm. longae et 0.5 mm. latae, pubescentes. *Flores* subsessiles, 6-7 mm. longi, deflexi; calyx in toto circiter 6 mm. longus, extra pilis fulvis glandulisque ornatis, intus glaber, dentibus inaequalibus subulatis, quarum superior 2.5 mm. longa, lateralibus circiter 4 mm. longis et inferioribus circiter 5 mm. longis; vexillum obovatum, apice rotundatum, circiter 6.5 mm. longum et 3 mm. latum, biauriculatum, biappendiculatum, 1 mm. longe unguiculatum, extra pubescens et glandulosum; alae oblongae, 5-6 mm. longae, glabrescentes; carina naviculariformis, circiter 6 mm. longa, extra densissime glandulosa. *Legumen* oblongo-ovatum, statu immaturo 1 cm. longum, pilis fulvis longis patentibusque dense obtectum.

TANGANYIKA TERRITORY. Rungwe District, Bundali, 1400 m. 3 March 1914, A. Stolz 2571 (type).

The following synonymy, published at the request of Dr. Staner, is necessary on account of *Eriosema Richardi* var. *ovata* Staner et De Craene proving to be the same as *E. Buchanani* Bak. f.

Eriosema Buchanani Bak. f. in Journ. Bot. **33**, 145 (1895); Leg. Trop. Afr., 505 (1929). *E. Richardi* Benth. ex Bak. f. var. *ovata* Staner et De Craene in Rev. Zool. Bot. Afr. **24**, 286 (1934).

Eriosema Buchanani Bak. f. var. **Richardi** (Benth. ex Bak. f.) Staner, comb. nov. *E. Richardi* Benth. ex Bak. f. Leg. Trop. Afr., 505 (1929); Staner et De Craene in Rev. Zool. Bot. Afr. **24**, 284 (1934). *E. polystachyum* Bak. in Oliv. Fl. Trop. Afr. **2**, 225 (1871) p.p.; Engl. Hochgebirgsfl. Trop. Afr. 272 (1892), p.p. non E. Mey.

Eriosema Buchanani Bak. f. var. **Richardi** (Benth. ex Bak. f.)
Staner forma **elliptica** (Staner et De Craene) Staner, comb. nov.
E. Richardi Benth. ex Bak. f. forma **elliptica** Staner et De Craene
in Rev. Zool. Bot. Afr. **24**, 286 (1934).

Loranthus tetraparitus E. A. Bruce, sp. nov. [Loranthaceae];
affinis *L. messinensi* N. E. Br. (§ *Acrostachys*) sed floribus longioribus
gracilibus, foliis latioribus minus carnosus differt.

Caules teretes, 6 mm. diametro, glabri, internodiis 1–3 cm.
longis griseo-cinereis. *Folia* petiolata, petiolo 1–2 cm. longo supra
canaliculato; lamina ovato-lanceolata vel late elliptica, leviter
carnosa, 3·5–4·5 cm. longa, 2–4 cm. lata, glabra, apice obtusa basi
cuneata, nervis lateralibus utrinque circiter 4 ascendentibus.
Racemi 12–15 cm. longi, basi 2 mm. lati, glabri, 40–50-flori. *Pedi-*
celli 2–4 mm. longi, glabri, crassi, e basi leviter dilatati, apice
unibracteolati, bracteola ovata concava apice obtusa vel truncata
1·5 mm. longa. *Calyx* (receptaculo incluso) cupuliformis vel
campanulatus, 2–3 mm. longus, truncatus vel undulatus. *Corolla*
polypetala, flavida, alabastro subacuta, 2·1 cm. longa, basi 2 mm.
lata, 4 mm. supra basin leviter contracta, apice 0·7 mm. lata;
petala 4, linearia, 3 mm. supra basin reflexa, parte reflexa 2 cm.
longa, intus margine leviter puberula, infra stamina plicata. *Stamina*
erecta, supra partem plicatam corollae inserta, filamentis rubris
8 mm. longis, antheris linearibus 8 mm. longis nec transversi-
septatis. *Stylus* gracilis, 1·5 cm. longus, glaber, stigmate capitato.

TANGANYIKA TERRITORY. Dodoma District, near Dodoma-
Iringa Road, 3200–3400 ft., parasitic on unidentified species (possibly
Vangueria), in dry thickets, G. W. St. Clair Thompson 369 (type).

Clausenopsis Hildebrandtii (Engl.) Milne-Redhead, comb. nov.
et descr. ampl. [Rutaceae]. *Clausena*? *Hildebrandtii* Engl. Pflanz-
zenw. Ost-Afr. C. 229 (1895). *C. Hildebrandtii* Engl. in Engl.
Pflanzenw. Afr. **3**, i, 758 (1915) in Engl. Pflanzenfam, ed. 2, **19A**,
322 (1931).

Frutex vel arbor parvus, dioicus, deciduus. *Inflorescentiae*
axillares, usque 2·5 cm. longae, parviflorae; pedunculi, pedicelli
et calyces dense vel densissime breviter pubescentes; bracteae
minutae, pubescentes; pedicelli usque 4 mm. longi. *Flores* ♂:—
Sepala 4, ovata, obtusis circiter 1 mm. longa, inaequalia. *Petala*
4, oblonga, obtusa, basi vix angustata, 5·5 mm. longa. *Stamina* 8, in-
aequalia, usque 5 mm. longa; filamenta libera, leviter compressa,
superne angustata, glabra. *Ovarium* sterile, ellipseideum, apice
minute capitatum, circiter 1 mm. longum. *Flores* ♀:—*Sepala* iis
florum masculorum similia. *Petala* 4 vel 5, inaequalia, ovata,
obtusa, usque 4 mm. longa, 25 mm. lata, glabra. *Staminodia* 0.
Ovarium pyriforme, circiter 2 mm. longum, vix 2 mm. diametro,
glabrum, glanduloso-punctatum; stylus brevissimus, robustus;
stigma capitatum.

KENYA COLONY. Ukamba Province : near Kitui, June 1877, *Hildebrandt* 2814 (type in Herb. Berol.) :—a tree or shrub with leaves and fruit smelling like juniper. Masai Province : on dry rocky slope covered with herbaceous plants on Capt. Cowie's farm near M'Bagathi, 1750 m., 6 Nov., 1932, *Gilbert Rogers* 30 :—an erect stunted branched shrub, about 2 m. high ; flowers appear with the new leaves, aromatic ; ovary gland-dotted ; ♀ flowers only : in open dry secondary scrub forest on Capt. Cowie's farm near M' Bagathi, 1750 m., 16 Nov., 1932, *Gilbert Rogers* 42 :—staminate flowers of no. 30 : in open dry stunted secondary forest at Bahati., M'Bagathi District, 1750 m., 12 Feb., 1933, *Gilbert Rogers* 410 :—leaves and fruit of a deciduous dioecious shrub, 2·5 m. high : flowers collected previously.

In September 1896, Engler published a description of *Vepris* ? *angolensis*, and formed a new section, *Clausenopsis* Engl., to which his new species was referred. The type specimen is *Welwitsch* 1315 in Coimbra Herbarium.

A few months later in the same year Hiern described *Clausena melioides* from a duplicate of the same Welwitsch number in the British Museum Herbarium. The identity of these two plants does not appear to have been realised until 1931, when Engler's account of the *Rutaceae* in the second edition of the 'Pflanzenfamilien' was published. Engler here raises *Clausenopsis* to generic rank, placing it in the *Toddalieae*, and reduces *Clausena melioides* Hiern to a synonym of *Clausenopsis angolensis* (Engl.) Engl.

Clausena ? *Hildebrandtii* Engl. a species from Kenya Colony, whose fruits are practically indistinguishable from those of *Clausenopsis angolensis*, was, strange to say, retained by Engler in *Clausena* as an anomalous species. *C. Hildebrandtii* is now transferred to *Clausenopsis*, and a description of its flowers is also published, made possible by the very complete material recently received at Kew from Mr. C. Gilbert Rogers.

Raphionacme caerulea E. A. Bruce, sp. nov. [Asclepiadaceae] ; affinis *R. lineari* K. Schum. sed lobis corollae latioribus acutis, lobis corollae bifidis valde distinctis.

Herba perennis, lignosa, pubescens, 0·6–1 m., alta, tubero crasso. *Caules* simplices, erecti, pubescentes. *Folia* subsessilia, leviter pubescentia, linearia, basi obtusa, apice acuta, 9–10 cm. longa, circiter 5 mm. lata, margine incurvo ciliato, costa media supra impressa infra prominente. *Inflorescentia* laxa, elongata, 5–10-cymulosa, cymulis 2–3 -floris sessilibus 2–5 cm. distantibus ; pedicelli 1–2 cm. longi, pilosi, bracteis parvis lineari-lanceolatis mox deciduis. *Calyx* fere ad basin 5-lobatus, lobis lanceolatis 5 mm. longis 1·5 mm. latis acutis extra pilosis intra glabris, margine ciliato. *Corolla* caerulea, 5-lobata ; tubus late campanulatus, 4 mm. longus et latus, leviter pilosus ; lobi oblongo-lanceolati, acuti vel subacuti, 1·9 cm. longi, 7 mm. lati, extra leviter pilosi, intus glabri. *Coronae-lobi* e fauce corollae tubi orti, erecti, glabri, lateraliter compressi,

ventraliter explanati, trapezoidei, 1 cm. longi, infra apicem 0.5 cm. lati, basin versus constricti, apice bifidi vel bicornuti, cornubus 2 mm. longis, angulis lateralibus breviter cornutis. *Antherae* 4 mm. longae, anguste triangulares, conniventes.

SIERRA LEONE. Near Bumban, 300 m., on bare granite, a woody, blue-flowered herb, 0.6–0.9 m. high, with a thick fleshy tuber, growing in a mat of *Eriospora* roots, *Deighton* 1246 (type).

Pluchea monocephala E. A. Bruce, sp. nov. [Compositae]; affinis *P. nitense* O. Hoffm. sed foliis lineari-lanceolatis, bracteis involucri pubescentibus differt.

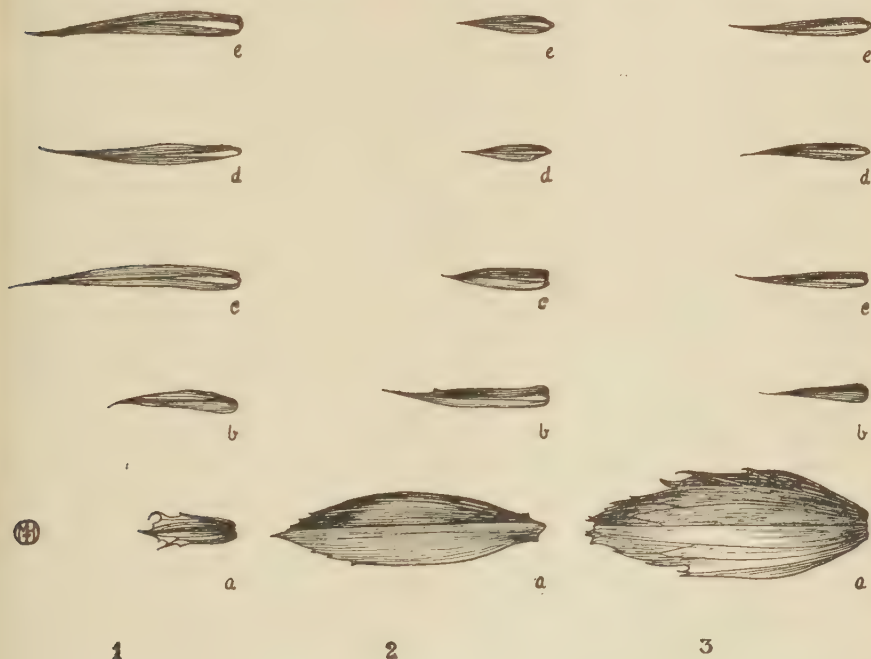
Herba perennis, erecta vel suberecta, ramosa, caule inferne lignescente, ramis alternis erecto-patentibus striatis 1–2 cm. distantibus leviter villosis demum glabrescentibus. *Folia* alterna, sessilia vel subsessilia, lineari-lanceolata, 0.7–3 cm. longa, 0.2–1 cm. lata, apice acuta vel subacuta, basi cuneata, margine integra, utrinque villosa, demum glabrescentia. *Capitula* solitaria, late campanulata, 0.7–1 cm. longa, 0.8–1.5 cm. lata, longe pedunculata. *Pedunculi* ramos laterales terminati, 2–6 cm. longi, bracteati, bracteis 2 mm. longis lineari-lanceolatis. *Bractee* involucri circiter 5-seriatae, imbricatae, ab exterioribus brevibus ovato-lanceolatis circiter 1.5 mm. longis ad intimas elongatas usque 8 mm. longas lineari-lanceolatas, omnes leviter ad apicem dense pubescentes, acuminatae, stramineae, nervo medio brunneo ad apicem latiore. *Receptaculum* alveolatum, breviter setulosum. *Flores* radii ♀, pauci; corolla filiformis, glabra, 4 mm. longa, apice minute dentata, stylo 2 mm. exserto apice profunde bilobo, lobis gracilibus 2 mm. longis. *Achaenia* immatura 1.5 mm. longa, oblongo-cylindracea, dense adpresso-sericeo-pubescentia, pappo setis pluribus brevibus persistentibus et setis longioribus 2–4 mox deciduis circiter 2 mm. longis coronata. *Flores* disci ♂ numerosi; corolla purpurea, tubulosa, apice sensim et leviter expansa, circiter 6 mm. longa, apice 1 mm. basi 0.5 mm. lata, glabra, breviter 5-lobata, lobis acutis setis paucis ornatis e sinubus ad basin corollae nervis 5 brunneis notata; antherae apice appendiculatae, basi breviter caudatae, caudis cohaerentibus; stylus 0.5 mm. exsertus, breviter bilobus, lobis clavatis obtusis. *Achaenia* matura 2 mm. longa, cetera foeminea simulantia.

TANGANYIKA TERRITORY. Ngorongoro Crater, about 1800 m., in saline soils near Magadi Lake on flat game-plains. *B. D. Burt* 4331 (type); Ngorongoro, 1800 m. a very common weed associated very largely with *Cynodon plectostachyus* on the lower slopes of the crater, *R. R. Staples* 288.

Crossandra thomensis Milne-Redhead, sp. nov. [Acanthaceae]; habitu et foliis iis *C. guineënsis* Nees similis, sed calyce longiore et bracteis calyce multo brevioribus differt.

Herba perennis, usque 25 cm. alta; caules inferne procumbentes, radicanes, superne erecti vel adscendentes, foliosi, 280

densissime et crispule hirsuti, internodiis 1-6 cm. longis. *Folia* petiolata, obovata vel oblongo-obovata, apice brevissime et obtusissime acuminata, basi cordata vel subauriculata; laminae usque 8.5 cm. longae, discolores, supra pilis sparsissime adpersae, subtus nervis densiuscule crispule hirsutis; petioli usque 1.2 cm. longi, densissime et crispule hirsuti. *Inflorescentiae* terminales, circiter 10-florae; rhachis puberulus; bracteae oblongae, leviter concavae, sessiles, margine superne spinulis brevibus instructae, usque 6 mm. longae et 2.5 mm. latae, papyraceae, puberulae; bracteolae lanceolatae, leviter concavae, apice mucronatae, circiter 9 mm. longae, papyraceae, puberulae. *Calycis segmenta* 5, libera subaequalia, anguste lanceolata, apice mucronata, margine superne minutissime dentata vel integra, posticum et antica circiter 14 mm. longa et 2 mm. lata, lateralia circiter 13 mm. longa et 1.5 mm. lata, omnia papyracea, puberula. *Corollae tubus* anguste cylindricus, circiter 2.5 cm. longus, medium versus 1.5 mm., basi 2.5 mm. diametro; limbus circiter 2.5 cm. diametro. *Stamina* tubo affixa; filamenta circiter 2.5 mm. longa, superne leviter hirsuta; antherae dithecae, 2.5 mm. longae, superne leviter hirsutae. *Discus* minutus. *Ovarium* ob-



1, *Crossandra thomensis* Milne-Redhead; 2, *C. guineënsis* Nees; 3, *C. Tallotii* S. Moore. a, bract; b, bracteole; c, posterior calyx segment; d, lateral calyx segment; e, anterior calyx segment; all $\times 2$.

longum, circiter 2.5 mm. longum, glabrum ; stylus filiformis, circiter 2 mm. longus, glaber. *Capsula* circiter 1.5 cm. longa, 4-sperma ; semina glabra, dense tuberculata, circiter 2.5 mm. diametro.

SÃO TOMÉ. Rio Salgado, Angolares, 50 m., Jan. 1886, *Quintas* 1089 (type in Herb. Coimbra) :— herb ; flowers bright violet.

At first sight *C. thomensis* might be mistaken for the common West African species, *C. guineënsis* Nees, so similar is the general appearance of the plants. The bracts, so conspicuous a feature in *C. guineënsis* and in *C. Talboti* S. Moore, another closely allied species, are in *C. thomensis* relatively inconspicuous, being considerably shorter than the calyx segments. The relative sizes and shapes of the bracts, bracteoles and calyx segments of these three species are shown in the accompanying figure.

Disperma eremophilum *Milne-Redhead*, sp. nov. [Acanthaceae] ; a *D. trachyphylo* Bullock foliis obtusis pilis albis stellatis indutis, bracteis et calyce longe albo-villosis, inflorescentiis 1-3-floris differt.

Frutex parvus, erectus, deciduus. *Rami* adscendentes, recti, rigidi, quadrangulares, internodiis usque 8 cm. longis ; cortex minute et crispule albo-pubescent, demum glaber, deciduus, secundum angulos longitudinaliter fissus. *Folia* subsessilia, obovata, apice rotundata, truncata vel leviter emarginata, basi cuneata, crenulato-dentata, usque 3 cm. longa et 1.5 cm. lata, utrinque pilis albis stellatis radio centrali elongato densiuscule induta, inferne pilis longis albis simplicibus ciliata ; petioli usque 2 mm. longi, basi ramos amplectentes. *Inflorescentiae* 1-3-florae, axillares, subsessiles ; bracteae sub anthesi obtriangulares, apice obscure tridentatae, circiter 1 cm. longae, superne 6 mm. latae, basi 2 mm. latae, superne pilis albis stellatis indutae, inferne extra et margine pilis longis simplicibus albis instructae, intus glabrae ; bracteolae oblongo-spathulatae, vix 1 cm. longae, indumento ei bractearum simili. *Calyx* sub anthesi inferne cylindricus ; segmenta duo antica fere usque ad apicem connata, 8 mm. longa ; segmenta tria postica 7 mm. longa, superne 2 mm. libera, acuta ; calyx extra pilis longis albis simplicibus dense indutus, intus glaber. *Corolla* circiter 1.4 cm. longa, obscure bilabiata, glabra ; tubus inferne cylindricus, superne leviter ampliatus, fauce valde venoso-palatifera, circiter 1 cm. longus ; segmenta apice breviter bilobata. *Stamina* 4, glabra ; antica filamentis circiter 4 mm. longis, postica filamentis 2 mm. longis instructa ; antherae aequales, 1.5 mm. longae, muticae. *Discus* cupularis, 0.5 mm. altus. *Ovarium* oblongum, 1.5 mm. longum, 2-ovulatum, glabrum ; stylus filiformis, circiter 1.3 cm. longus, glaber, apice breviter bilobus, lobis filiformibus inaequalibus. *Capsula* calyce et bracteolis accrescentibus inclusa, 6 mm. longa, glabra, disperma.

KENYA COLONY. Turkana Province : S. Turkana, without locality, 900 m., June 1932, *Buxton* 1026 (type) ;—a small shrubby plant abundant everywhere in dense clumps. Northern Frontier Province : very plentiful in places in the Kaisut " Desert " and on

Isiolo-Laisamis road, 600 m., 17 Dec., 1932, *Edwards* 1911-57:—a well shaped shrub about 45 cm. high in open on red very sandy soil. By the Tana River between Sankuri and Saka, 180 m., 14 April, 1934, *Sampson* 74 :—common desert shrub in "grey bush"; this specimen was in leaf as it was growing in a hollow where water had settled—elsewhere not in growth.

In the key to the genus *Disperma* C. B. Cl. in the Flora of Tropical Africa, Clarke describes the calyces of *D. crenatum* (Lindau) Milne-Redhead (*D. quadrisepalum* C. B. Cl.) and *D. parviflorum* (Lindau) C. B. Cl. as having their three posticous segments free. If the calyces are carefully examined at the time of flowering, it will be seen that the segments are united for at least two-thirds of their length, forming a very definite tube. At a later stage the developing capsule splits the calyx along the lines of fusion of the three posticous segments, whilst the two anticous segments remain fused, resulting in the condition which Clarke describes. The same applies to *D. trachyphyllum* Bullock, although in this case the segments are extremely easily separated on dissection at the flowering stage. In *D. kilimandscharicum* (Lindau) C. B. Cl., the calyx of which Clarke describes as being subequally 5-fid, the ultimate separation of the segments does not take place at all or else a short split occurs which does not reach the base.

Disperma eremophilum is closely related to the four species mentioned above, from all of which it differs in having stellate indumentum and few flowered inflorescences. The segments of its calyx, which are at first fused, are ultimately free.

Rhinacanthus pulcher *Milne-Redhead*, sp. nov. [Acanthaceae]; a *R. nasuto* (L.) Kuntze floribus maximis, antherarum thecis longe discretis haud contiguis, capsulis majoribus facile distinguendus.

Frutex laxè ramosus, circiter 1 m. altus, plus minusve deciduus. *Ramuli* primo minute tomentosi et subtiliter striati, demum cortice plus minusve suberoso obtecti. *Folia* anguste ovata, apice vix acuta, basi in petiolum circiter 5 mm. longum contracta, circiter 4 cm. longa et 1.7 cm. lata, utrinque minute scabrida praesertim costa et nervis lateralibus. *Panicula* ampla, ramis minute tomentosis et valde glandulosis; flores ad apices ramorum conferti; bracteae et bracteolae lanceolatae, calyce breviores, glandulosae. *Calyx* alte 5-fidus, circiter 7 mm. longus, extra glandulosus, intus glaber; segmenta anguste linearia, acuta. *Corolla* lactea, circiter 4.5 cm. longa; tubus tenuiter cylindricus, ad faucem vix ampliatus, circiter 2 cm. longus et 2 mm. diametro, extra basi excepta pubescens, intus glaber; limbus 2-labiatus, extra parcissime pubescens, intus minute et parce glandulosus; labium posticum lineari-lanceolatum, apice minute bifidum, 2.5 cm. longum, 3.5 mm. latum, leviter convexum; labium anticum latum, plano-patens, 2.5 cm. longum, 2.2 cm. latum, 3-lobatum, lobis ovatis obtusis aequalibus 14 mm. longis 8 mm. latis. *Stamina* 2, ad faucem affixa, corollae labiis breviora, circiter 1.4 cm. longa; antherae dithecae, thecis inter

se 3 mm. distantibus late ellipsoideis 1.5 mm. longis. *Discus* minutus, cupularis. *Ovarium* oblongum, circiter 2 mm. longum, glabrum; stylus circiter 3.4 cm. longus, inferne parce pilosus, superne glaber, apice minute bifidus. *Capsula* circiter 2.5 cm. longa, extra pubescens. *Semina* 4, matura non visa, immatura rugosa.

KENYA COLONY. Northern Frontier Province: Tana River, in desert between Hamagi and Dakacha, 250 m., March 1934, *Sampson* 4.

This very striking species appears to be most closely allied to the variable and widely spread *Rhinacanthus nasutus* (L.) Kuntze, although in the size of its flowers it approaches the Asiatic *R. calcarata* (Wall.) Nees, a species from which it differs considerably in leaf and inflorescence. *R. pulcher* appears to be unique in the genus in having its anther-thecae completely separate, the points of attachment to the filaments being about 3 mm. apart. Leaf development was very poor on the specimens collected, and in consequence the dimensions given in the description may be expected to be exceeded when material is collected at a more favourable season.

Staurogyne capitata E. A. Bruce, sp. nov. [Acanthaceae]; ab omnibus speciebus africanis inflorescentia capitata differt.

Herba decumbens, ramosa; caules compressi, leviter striati, dense strigosulo-pubescentes, decumbentes, radicibus adventitiis numerosis instructi, internodiis elongatis. *Folia* petiolata, petiolo usque ad 2 cm. longo dense strigosulo-pubescente; lamina ovata vel elliptica, 2-6 cm. longa, 1.5-4 cm. lata, basi latissime cuneata, apice obtusa, nervis lateralibus utrinsecus 4 vel 5 dense strigosulo-pubescentibus. *Inflorescentia* terminalis, 2-5-flora, capitata. *Bracteae* oblongae, circiter 9 mm. longae, 2.5 mm. latae, apice rotundatae, basi cuneatae, bracteolis 2 minoribus lineari-oblongis circiter 7 mm. longis 1.5 mm. latis strigosulo-pubescentibus. *Calyx* 5-lobatus, tubo campanulato circiter 3.5 mm. longo, lobis abaxialibus 2 lineari-lanceolatis acutis 3 mm. longis, lateralibus 2 minoribus 1 mm. longis acutis, adaxiale 1 majore late lanceolato 4.5 mm. longo basi 3 mm. lato apice subacuto, omnibus strigosulo-pubescentibus. *Corolla* alba, glabra, 1.3 cm. longa, tubuloso-cylindrica, basin versus constricta, tubo circiter 1 cm. longo fauce 4 mm. basi 1.5 mm. lato, lobis imbricatis orbiculari-ovatis circiter 3 mm. longis 2 mm. latis apice rotundatis. *Stamina* 4, didynama, basi tubi corollae inserta; filamenta circiter 7 mm. longa, compressa, apicem versus valde pubescentia; antherae 2-loculares, loculis divaricatis ellipsoideis circiter 0.5 mm. longis. *Ovarium* late ovoideum, circiter 1.5 mm. longum, stylo simplice circiter 8 mm. longo, stigmatibus 3-lobato, lobo medio ovato, 2 lateralibus minoribus linearibus. *Capsula* late ovoidea, 3 mm. longa, 2.5 mm. lata, pallide fusca; semina compressa, ellipsoidea, numerosa, in loculis circiter 10.

LIBERIA. Fayapulu, on wet rocks, a trailing plant with white flowers, *J. Bequaert* 1141 (type) ; no locality *O. F. Cook* 139.

GOLD COAST. Axim District ; Asamang, herb with white flowers, in moist humid parts of rain forest, *T. F. Chipp* 154.

Only three species of this genus have hitherto been recorded from Tropical Africa :—*S. kamerunensis* (Engl.) Benoist, from the Cameroons and Southern Nigeria, *S. Le-Testuana* Benoist, from Komba and Maiombe, French Congo, and *S. congoensis* S. Moore, also from Maiombe. These species differ from *S. capitata* in their long spicate inflorescence.

***Coleus equisetiformis* E. A. Bruce**, sp. nov. [Labiatae] ; ab omnibus speciebus africanis pedicellis longioribus rigidis disarticulatis, calycis lobis linearibus fere subaequalibus differt.

Herba perennis, erecta, 1 m. alta, internodiis 2–5 cm. longis infimis tomentosis superioribus glandulosis pilis brevibus patentibus instructis. *Folia* aromatica, opposita, breviter petiolata vel subsessilia, petiolo brevi usque ad 8 mm. longo tomentoso ; lamina ovato-lanceolata, 4·5–7·5 cm. longa, basi 2–2·5 cm. lata, apice sensim acuminata, basi truncata vel subcordata, margine crenato-serrata, subtus tomentosa, nervis reticulatis valde distinctis, supra glabra vel minute puberula. *Inflorescentia* composita, 20–30 cm. longa, inferne ramosa, verticellis 6-floris, internodiis circiter 3 cm. longis. *Bractee* ovato-lanceolatae, 0·5–1 cm. longae, pubescentes ; pedicelli rigidi, ascendentes, 1·5–3 cm. longi, apice disarticulati. *Calyx* statu florifero campanulatus, 4 mm. longus, extra glandulosus et strigosulo-pubescent, intus glabrescens ; tubus brevis, 1·5 mm. longus ; dentes 5, lineares, circiter 2·5 mm. longi, acuminati, 2 infimis paullo longioribus ; statu maturo accrescens, usque ad 1 cm. attingens. *Corolla* lilacina, bilabiata, 12–15 mm. longa, extra pubescens ; tubus circiter 6 mm. longus, basi ventriculosus, 1·5 mm. longus, supra geniculatus, demum ampliatus ; labrum superior trilobatum, 5 mm. longum, lobo mediano emarginato ; inferior ovato-ellipticum, circiter 1 cm. longum, 5 mm. latum, integrum, longitudinaliter plicatum. *Stamina* inclusa, basi connata et ad corollam adhaerentia, superne 8 mm. libera, antheris medifixis 0·5 mm. longis. *Stylus* staminibus subaequilongus, apice bifidus. *Nuculae* ellipsoideae, 2 mm. longae, 1 mm. latae.

TANGANYIKA TERRITORY. Mpwapwa, Kibariani Mts., 1650 m. in upper *Protea-Brachystegia* savannah on rubble soil with shallow humus in the shade of trees, *B. D. Burtt* 3892 (type) ; Mpwapwa North, 1500–1800 m., in good soil on mountain, *Mr. & Mrs. Hornby* 442.

C. equisetiformis appears to be a link between *Coleus* and *Holostylon*. The general appearance, the form of the calyx and the long, stiff pedicels resemble *Holostylon*. It differs from this genus in the inflorescence, the verticels being simple and not pedunculate monochasials, and also the style, which is bifid and not entire. It resembles *Coleus* in the inflorescence, the form of the corolla and the united filaments.

The following paper contains an account of those tropical African species of *Royena* Linn. (*Ebenaceae*) which are related to *R. macrocalyx* Gürke. These species form a natural group distinguished by their small cymose inflorescences and a tendency to have larger leaves than is usual in the genus and to develop an arborescent habit. In these respects they approach the genus *Diospyros* Linn., from which they differ chiefly in having hermaphrodite flowers. In the present state of our knowledge the differences between the two genera are not absolutely clear-cut and my chief reason for placing these species in *Royena* (following Gürke) rather than *Diospyros* (following Hiern) is that I can find no close affinity for them in the latter genus, whereas they are evidently related to the other species of *Royena* through the South African *R. villosa* Linn. (see p. 288).

The geographical distribution of the five species of this group is interesting and confirms the specific rank given to them on morphological grounds. *R. heterotricha* is the only species which occurs on the west of the continent and it is confined to Angola and the Congo. *R. macrocalyx*, as here understood, extends down the eastern side of the continent from Kenya to Portuguese East Africa but not more than about 100 miles from the coast. The two arborescent species occupy rather restricted areas, *R. zombensis* in Nyasaland and upper Portuguese East Africa, *R. amnicola* in the Mpwapa district of Tanganyika Territory. The fifth species is also found in Tanganyika, but further west, chiefly around Singida and Tabora where it is a shrub of grasslands.

In the citation of specimens the letters B.M. stand for the British Museum herbarium, and O. for the herbarium of the Imperial Forestry Institute, Oxford. The numbers in the text refer to the bibliography at the end of the paper.

KEY TO THE SPECIES ENUMERATED.

Bracts ovate, rounded at the base; fruiting calyx enlarged and enclosing the fruit. 1. *macrocalyx*.

Bracts linear or linear-lanceolate, narrowed to the base; fruiting calyx enlarged, but the lobes more or less reflexed.

Calyx long-pubescent or glandular outside.

Leaves, at least when young, thinly pubescent on both surfaces.

2. *heterotricha*.

Leaves glabrous or glandular above, pubescent on the nerves or glabrous below.

3. *zombensis*.

Calyx densely villous outside.

Petioles 5 mm. long; leaves obovate; usually a large riverine tree.

4. *amnicola*.

Petioles short, 2 mm. long; leaves oblong-obovate; a small savannah shrub.

5. *Fischeri*.

1. *Royena macrocalyx* Gürke in Engl. Pflanzenwelt Ost-Afrikas, C. 305 (1895); in Engl. Bot. Jahrb. 26, 62 (1898). *Diospyros macrocalyx* Klotzsch in Peters, Reise nach Mossamb. 182 (1862)—non A. DC. Prodr. 8, 226 (1844). *Diospyros Loureiriana* Hiern, Monogr. Ebenac. 194 (1873)—? non G. Don, Gen. Syst. 4, 39 (1838). *Diospyros Loureiriana* var. *macrocalyx* (Klotzsch) Hiern in Journ. of Bot. 13, 355 (1875); in Oliver, Fl. Trop. Afr. 3, 522 (1877).

In 1790 Loureiro (1) recorded a specimen of *Diospyros Lotus* Linn. from E. Africa, almost certainly from Mozambique where he was delayed for three months on his way back from China. His description of it was:—

“*Arbuscula* 6-pedalis: *ramis* patentibus. *Folia* ovato-lanceolara, integerrima magna, alterna, glabra, paginis discoloribus, costis obliquis prominentibus. *Flos* pallidus, terminalis, solitarius: *calyce* foliaceo maximo, 4-5-partito, plano, permanente. *Bacca* rotunda, semipollicaris, lutea, lanuginosa, 1-locularis, 8-sperma: *seminibus* compresso-oblongis, osseis: *pulpa* vix ulla.”

G. Don (2) believed Loureiro's plant to be distinct from *Diospyros Lotus* Linn. and based a new species, *D. Loureiriana*, upon it; he incorrectly gave the locality as Cochinchina. A. De Candolle (3) corrected the locality to E. Africa but considered the species *non satis nota*.

The species rested upon Loureiro's description alone until Hiern's monograph of the family in 1873. He identified with it (4) several specimens collected by Sir John Kirk in Portuguese East Africa and others from the Congo and Angola collected by Burton and Welwitsch respectively. Hiern also described one of Welwitsch's specimens as variety *vernalis*. A manuscript note on the Kew copy of his monograph reads “The specimens from the Western side of the continent may perhaps belong to a different species (*D. heterotricha*) from those of the Eastern side, differing by a less amplified fruit calyx. W.P.H. 24/xii/74.”

Hiern reduced *Diospyros macrocalyx* Klotzsch (5) to a synonym of *D. Loureiriana*. Gürke, however, has pointed out (6,7) that Loureiro's description of the plant he called *Diospyros Lotus* does not agree with Klotzsch's plant. It differs in the glabrous leaves, the solitary terminal flowers and the unilocular fruit.

I have examined the type specimen of *D. macrocalyx* Klotzsch and it is an excellent match of Kirk's specimens named *D. Loureiriana* by Hiern. Loureiro's specimen of the latter I have been unable to trace. It is not in the British Museum herbarium, nor is it mentioned by Gomes (8) in his lists of Loureiro's specimens at Paris and Lisbon, and I therefore conclude it is amongst those that have been lost. In the absence of a specimen and in view of the differences between Loureiro's description and the plants identified with it, it is proposed that the name *D. Loureiriana* should be discarded.

Gürke (6,7) transferred *D. macrocalyx* Klotzsch (= *D. Loureiriana* G. Don sensu Hiern) to *Royena*, but as the name *D. macrocalyx* Klotzsch is illegitimate, being a later homonym of *D. macrocalyx* A. DC., *Royena macrocalyx* must be regarded as a new name and be attributed to Gürke alone. I find there is a close affinity between *R. macrocalyx* and *R. villosa* Linn., a South African species found in forests from the George Division eastwards to Natal. Points of affinity include the size of the leaves, which are larger than is usual in the S. African species, the three-flowered peduncles and the hermaphrodite flowers, and are sufficient to justify the inclusion of *R. macrocalyx* in *Royena* rather than in *Diospyros*. Hiern placed *D. Loureiriana* in his section *Guaiancana* of *Diospyros* but I do not find that the other species, from Madagascar, Borneo and Malacca, are closely related.

Certain variations which are noticeable in the material of *R. macrocalyx* in the Kew herbarium may assume greater importance when our knowledge of the species increases, for they seem to be correlated with geographical distribution. The specimens from Kenya and Tanganyika are, on the whole, more hairy than those from Portuguese East Africa, the young leaves and branchlets especially being quite densely setose; the leaves also are inclined to be shorter and broader in the northern material. It may also be noted that according to Peters a red dye is obtained from the roots of the Mozambique plant whereas in Kenya and Tanganyika the dye is black. These differences are not absolutely constant, however, and the specimens from Kenya, Tanganyika and Portuguese East Africa should be regarded as conspecific.

KENYA COLONY. Mariakani, "a large shrub up to 12 ft. growing in grass and savannah lands: leaves very pubescent on both surfaces when young: old leaves glossy and dark green on upper surfaces: flowers white, sepals persistent and accrescent: a black dye is obtained from the roots," "mkuropunya" (Giriana), "mkongo" (Mkamba), "mdaa" (Swahili), 1929, *Graham* 1821.

TANGANYIKA TERRITORY. Usambara, Gombelo, July 1893, *Holst* 2126/A. N. Kilosa, Mamboya, c. 450 m., Jan. 1931, *Haarer* 1977. Kilosa subdistrict, Feb. 1921, *Swynnerton* 2008 (B.M.). Kilosa subdistrict, Dec. 1921, *Swynnerton* 2010 (B.M.). Morogoro district, "shrub 4 ft.: a black dye obtained from boiled roots, used for dyeing fibres for mats," c. 360 m., "mdala mweupe" (Kiswahili), Feb. 1932, *Wallace* 63. Morogoro district, near Mikase, "tree to 8 ft.: bark pounded and black colour dissolved out and used for dyeing cloth," 2,450 m. "mgoyo" (Kikame), "mdala" (Kiswahili), Feb. 1933 *Wallace* 679. Kissaki Steppe, 250 m., 1898, *Goetze*. Rufiji, "bush 15-20 ft. high, flowers green; very common on poor ground in sunny positions," c. 15 m., Dec. 1930, *Musk* 69. Lindi district, Quiloa (Kilwa), Jan. 1867, *Kirk* 109. Tendaguru, "wooded grassland," 180 m., Dec. 1930, *Migeod* 1037 (B.M.). Morogoro district, hills above the town, "lower alluvial slopes clothed with *Stereospermum*, *Combretum Zeyheri* and *Anona senegalensis*: cop-

piced shrub to small tree, 6-10 ft.; common and widely distributed," 600 m., Dec. 1933, *B. D. Burtt* 4892.

NYASALAND. Shire Highlands, Dec. 1893, *Scott Elliot* 8678. Chiromo, Shire, Jan. 1894, *Scott Elliot*, 8812.

PORTUGUESE EAST AFRICA. Sena, Oct. 1858, *Kirk*. Opposite Sena, Jan. 1859, *Kirk*. Between Lupata and Tette, Feb. 1859, *Kirk*. Rovuma river, March 1861, *Kirk*. Chibabava, Lower Buzi, 120 m. "a large shrub with creamy flowers occurring throughout from Zinyumbo to Inyamita," Dec. 1906, *Swynnerton* 1189.

2. *Royena heterotricha* (*Welw. ex Hiern*) *B. L. Burtt*, stat. nov., ob fructum minorem, calycis lobos reflexos, bracteas lineares virides et folia minora haud pro varietate *R. macrocalycis* Gürke habenda. *Diospyros Loureiriana* var. *vernalis* Hiern, Monogr. Ebenac. 195 (1873). *Diospyros Loureiriana* var. *heterotricha* Welw. ex Hiern in Journ. of Bot. 13, 355 (1875); in Oliver, Fl. Trop. Afr. 3, 522 (1877); in Cat. Welw. Afr. Pl. 1, pt. 3, 652 (1898); Greves in Journ. of Bot. 65, suppl. 2, 78 (1927).

BELGIAN CONGO. Without locality, Sept. 1863, *Burton*. Without locality, *Smith*. Boma, April 1906, *Pynaert* 7. Eala, Feb. 1919, *Corbisier* 145. Eala, May 1919, *Vermoesen* 2372. Temvo, Feb. 1919, *Vermoesen* 1589.

ANGOLA. Golungo Alto and Ambaca, 1855-56, *Welwitsch* 2535, 2535B. Malange, Oct. 1887, *Henriques* 17. Loanda, *Gossweiler* 431. Sumba, Peco, 50m., Dec. 1921, *Gossweiler* 8723.

As both Hiern and Gürke suspected there is no doubt that this is quite a distinct species from *R. macrocalyx*, for, in addition to the botanical characters mentioned in the diagnosis, it is completely isolated geographically.

3. *Royena zombensis* *B. L. Burtt*, species nova *R. amnicolae* *B. L. Burtt* affinis, speciei pariter arborescenti, sed calyce extra glanduloso nec villosa, foliis longius acuminatis, ramulis subglabris differt.

Arbor. *Ramuli* novelli basi perulati, tenuiter glandulis stipitatis vestiti, interdum setis mox caducis sparse instructi. *Perulae* infimae squamiformes, apicibus rotundatae, sensim in foliis transeuntes. *Folia* alterna, petiolata; petiolus 5 mm. longus, pubescens, supra canaliculatus et glandulosus; lamina obovata, acuminata, basi rotundata vel attenuata, 7-9 cm. longa, 3-4.5 cm. lata, supra costa interdum glandulosa excepta subglabra, subtus glabra vel costa et nervis pubescentibus; nervi laterales utrinque circiter 6. *Pedunculi* axillares, plerumque 3-flori, glandulosi, et saepe ad apicem versus minute pubescentes. *Bracteae* glandulosae, 4 mm. longae, lanceolatae, virides. *Pedicelli* 6-7 mm. longi, basi saepe bibracteolati, bracteolis 1 mm. longis. *Calyx* 5-lobatus, extra glandulosus et ad apices lorum minute pubescens, intus villosus; tubus 1 mm. longus; lobi sub anthesi 2.5 mm. longi, acuti, basi 2 mm. lati. *Corolla* late campanulata, glabra, fere ad basin 5-lobata; tubus vix

1 mm. longus ; lobi oblongi, 4 mm. longi, obtusi, recurvi. *Stamina* 10, per paria corollae lobis opposita ; filamenta vix ulla ; antherae villosae. *Ovarium* villosum, basi disco leviter lobato circumcinctum. *Styli* 5. *Fructus* globosus, c. 2 cm. diametro, breviter et molliter pubescens, calyce persistente, lobis nunc c. 1 cm. longis plus minusve reflexis, suffultus.

NYASALAND. Zomba, c. 810-900 m., "mchekecheta," Nov. 1915, *Purves* 260 (type). Shire Highlands, "mgulakula," *Buchanan* 271 (comm. Hort. Bot. Edin. Dec. 1881). Without locality, 1895. *Buchanan* 276 (B.M.). Chigamula reserve, "nkukukulu" (Yao), *Topham* 740 (O.). Zomba district, "ndima" (Nyanja, Yao and Ngoni), Jan. 1932, *Clements* 198 (O.). Without locality *Clements* 276, 374, 443 (O.).

The timber is used for poles ; the leaf extract as a cure for diarrhoea ; the bark for constipation (*Clements*).

Like the following species, *R. amnicola*, *R. zombensis* has been confused for some time with *R. macrocalyx* from which they are both readily distinguished by the narrow green bracts and the form of the fruiting calyx, for in *R. macrocalyx* the calyx tube and lobes both enlarge and the lobes broaden so that the fruit is more or less enclosed ; in *R. amnicola* and *R. zombensis* the lobes elongate, and as they become only slightly broader, do not enclose the fruit and are usually more or less reflexed.

Both *R. amnicola* and *R. zombensis* grow to be quite large trees, and in this way they are very different from the other species of *Royena*, which are usually shrubs.

4. *Royena amnicola* B. L. Burt, species nova ad praecedentem *R. zombensem* magis accedit ; ceterum *R. macrocalyci* Gürke affinis, sed, praeter habitum, bracteis linearibus vel lanceolatis viridibus, calycis lobis fructus maturi lanceolatis inter alia facile distinguitur.

Arbor usque ad 16 m. alta. *Ramuli* novelli basi perulati, primum dense piloso-pubescentes, demum glabrescentes. *Perulae* infimae squamiformes, brunneae, sensim in folia transeuntes. *Folia* alterna, petiolata, in eadem arbore satis variabilia, obovata (c. 7-8.5 cm. longa et 3-5 cm. lata) usque ad suborbicularia (c. 6.5 cm. longa et 5.5 cm. lata), semper breviter et abrupte acuminata, basi rotundata vel truncata, margine integerrima saepe leviter undulata, supra tenuiter subtus densius pubescentia et sparse, ad nervos densius, glandulosa ; nervi laterales utrinque circiter 6, cum costa supra impressi subtus prominuli ; petiolus 5 mm. longus, pubescens et glandulosus, supra canaliculatus. *Pedunculi* axillares, dense pubescentes, saepissime triflori. *Bractee* 3 mm. longae, lineares vel lanceolatae, virides, pubescentes. *Pedicelli* 5 mm. longi, pubescentes, basin versus bracteolis 2 1 mm. longis linearibus instructi. *Calyx* 4-5-lobatus, utrinque villosopubescent, tubus 1 mm. longus ; lobi 4 mm. longi, basi 2 mm. lati, acuti. *Corolla* late campanulata fere ad basin 4-5-lobata ; tubus vix 1 mm. longus ; lobi 5 mm. longi, dimidio superiore recurvi, obtusi, dorso leviter carinati et pubes-

centes, cetera glabri. *Stamina* 8-10, per paria corollae lobis opposita; filamenta vix ulla; antherae 2 mm. longae, dense villosae. *Ovarium* villosum, basi disco 10-lobato cinctum, 8-10-loculatum, loculis uniovulatis. *Stylus* 2 mm. longus, fere ad basin 5-partitus, superne leviter, inferne densius, pubescens. *Fructus* globosus, pubescens, 2.5-3 cm. diametro, 8-10-sperma, calyce accrescente lobis reflexis 2.7 cm. longis suffultus. *Semina* brunnea, 1.2 cm. longa, 0.8 cm. lata.

TANGANYIKA TERRITORY. Mpwapwa, Kikombo streams and Matamondo river, 1050-2000 m., "thick canopied tree 20-35 ft.; flowers small and white, dark, finely reticulate bark; locally common in riverine fringing forest of *Ficus vallis-Chaudae*, *Acacia*, etc." 3/xii/1933, *B. D. Burt* 5011. Mpwapwa, Kikombo Valley, 1200 m., "tree 30 ft. high with small white flowers; locally common in riverine fringing forest composed largely of *Ficus vallis-Chaudae*," 1/xii/1933, *B. D. Burt* 5041. Mpwapwa, junction of Buffalo and Iringa creeks, c. 1110 m., "tree near dry river bed" 24/iv/1933, *Mr. and Mrs. Hornby* 525. Mpwapwa, 1050 m. "small tree 15 ft. tall on brown soil in *Acacia-Deinbollia* formation, not uncommon," 12/i/1932, *Hornby* 420. Mpwapwa, c. 1000 m., "tree to 50 ft., leaves covered with soft hairs, large fruits; in fringing forest by edge of stream," 12/iii/1933, *Mr. and Mrs. Hornby* 523. Plain of Little Ruaha River, 45-65 miles south of Dodoma, "a common spreading tree of 25 feet with variegated red and yellow leaves and 'ball' fruit," 22/ii/1932, *Lynes P.R.* 39. Morogoro district 1290 m. "tree 6 ft.; flowers white, poles used in native roofs," "nyakititu" (Kiswahili), 18/ii/1932, *Wallace* 299.

5. *Royena Fischeri* (Gürke) Gürke ex Mildbraed in Notizblatt Bot. Gart. Berlin, **9**, 1055 (1926). *Diospyros Fischeri* Gürke in Engl. Bot. Jahrb. **14**, 311 (1892).

TANGANYIKA TERRITORY. Mwanza, Masura, 3/vi/1922, *Swynnerton* 1086 (B.M.), Tindi, c. 40 km. north of Nzega, 17/xii/1928, *Carnochan* 116 (B.M.). Shinyanga, 1080 m. "compact shrub 6-10 ft. high, fruits as large as cherries; common on copjes and bare hillsides," 25/v/1931, *B. D. Burt* 2432. 45 miles north of Tabora, "roots rubbed on the teeth said to produce a startling whiteness; medicine from roots used for stomach trouble of infants," "mlamata" and "nyakititu" (Kiswahili), "msindilo" (Kingasa), "msubata" (Kisumkumu), 8/xii/1926, *Wallace* 5. Kondoa district, Simba hills near Amathle, 1350 m. "a shrub to 6 ft. high in waste land near riverine forest," "benjero" (Irangi), 14/xii/1927, *B. D. Burt* 807. Kondoa-Iranga at Mkalama, "common shrub of rockland and on the escarpment," 1/xi/1925, *B. D. Burt* 345. Kondoa district, Mondo, 1350 m. "a shrub to 6 ft. high in waste rocky places," "mbanjiru" (Irangi), 5/i/1928, *B. D. Burt* 1024. Manyoni district, Kazikazi, 1200 m., "common; a finely reticulate dark brown-barked shrub or small tree 10 ft. high; flowers very

watery white and attractive to bees ; on ' semi-mbuga ' grey clay soils with *Combretum ternifolium* and *Acacia senegal*," 17/xii/1933, *B. D. Burtt* 4975.

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XXVI—A REVISION OF THE CHARACTERS OF NEO-DREGEA. S. GARSIDE (Bedford College).

The recent discovery of *Neodregea Glassii* C. H. Wright at Somerset West, Cape Province, South Africa, has enabled the author to study this rare liliaceous plant in its natural habitat, and to correct some errors in the original generic description which were no doubt due to the inadequate material then available.

Previous to its discovery at Somerset West, this monotypic genus was known only from the vicinity of Grahamstown, from which locality its discoverer, James Glass, sent immature fruiting material (*Glass* 674) to Kew, in 1896.

Plants in the flowering condition, collected by J. L. Drège "in damp ground at Cradock Place," and also "at Baakens River," both near Port Elizabeth, were collected in May 1909, and fruiting material in August of the same year. This material was sent to Kew by Dr. S. Schönland, and from it the excellent figure in "Hooker's *Icones Plantarum*" (Wright, 1913) was made. Fig. 4, giving details of the flower, is from the latter work. The only subsequent record of this plant, until the present observations were made, was by Miss Florence Paterson, also near Port Elizabeth. (*Paterson* 1162, Bethelsdorp, Aug. 1916. In *Herb. Bolus*.)

In August, 1929, the present writer found plants in some abundance on the lower southern slopes of Helderberg, on the farm Parel Vallei, Somerset West. They were bearing fruits with ripe seeds. (*Garside* 4053).

Its occurrence at Somerset West, about 390 miles west of Port Elizabeth, indicates that it may have a wide distribution, but owing to its small size and peculiar habitat, it has been overlooked by collectors.

An intermediate locality was indeed subsequently found by Miss A. V. Duthie, who obtained it at Knysna (*Duthie* 1131, Belvidere Church, Knysna, June 1931).

Unlike most South African *Liliaceae*, *Neodregea Glassii* is a shade-loving plant, and at Somerset West grows in damp soil under small veld bushes (1 to 2 metres high) of *Leucadendron adscendens* R. Br., *L. lanigerum* Buek., *Cliffortia ruscifolia* L., and *C. polygonifolia* L.; associated with it in the undergrowth are a few plants of *Ianthe flaccida* Nel., and some *Oxalis* spp., these being somewhat etiolated, and obviously growing under unfavourable conditions. Patches of small mosses are also frequent, but there is much bare soil.

In this very shaded habitat, the light intensity was found to be only one fifteenth that of full sunlight, this observation being made by means of a photographic actinometer (recording blue light only), at noon on Aug. 12, 1929, the sky being cloudless.

The shade temperature under the bushes was 26.5°C, the shade temperature in the open being 28° C, taken at the same time and date as the record of light intensity.

No plants of *Neodregea* were found exposed to full sunlight, and it is to be regarded as a typical "forest floor" plant, the canopy being composed of the low-growing proteaceous and rosaceous shrubs already mentioned.

A full grown plant is only from 4 to 6 cm. in length, about one half of this being the underground portion (Figs. 1, 2, and 3). The pyriform storage organ (Figs. 11, 11a, 12) was originally described as a bulb (*Wright* 1909), and superficially it has the appearance of one. However, its central portion (Fig. 12, C) consists of the greatly enlarged base of the flowering stem of the current year, and the membranous sheath which completely covers it is the leaf-base of the lower foliage leaf (Fig. 12, S). The storage organ is therefore a corm, and a longitudinal section shows a central swollen, starch-containing stem, covered by alternating leaf-bases and withered stem-bases, the latter being the remains of the corms of previous years. The old corms, one of which is shown in section in Fig. 12, OC, and in surface view in Figs. 11 and 11a, are arranged at one side only of the functioning corm, and the entire structure is therefore symmetrical about a vertical plane passing through the point of attachment of the old corms to the stem-base. Fig. 12 shows a section in this plane, all old corms except one having been removed.

Near the line of attachment of the innermost leaf-sheath, but separated from it by a ridge of tissue from which adventitious roots will later take their origin, the corm bears a small bud (Fig. 12, B), which can be regarded as standing in the axil of the sheathing leaf-base of the lower leaf. This bud will produce the flowering axis and leaves of next season's growth, drawing its food supplies from the corm to which it is attached during the early period of its development. The parent corm when exhausted is pushed to one

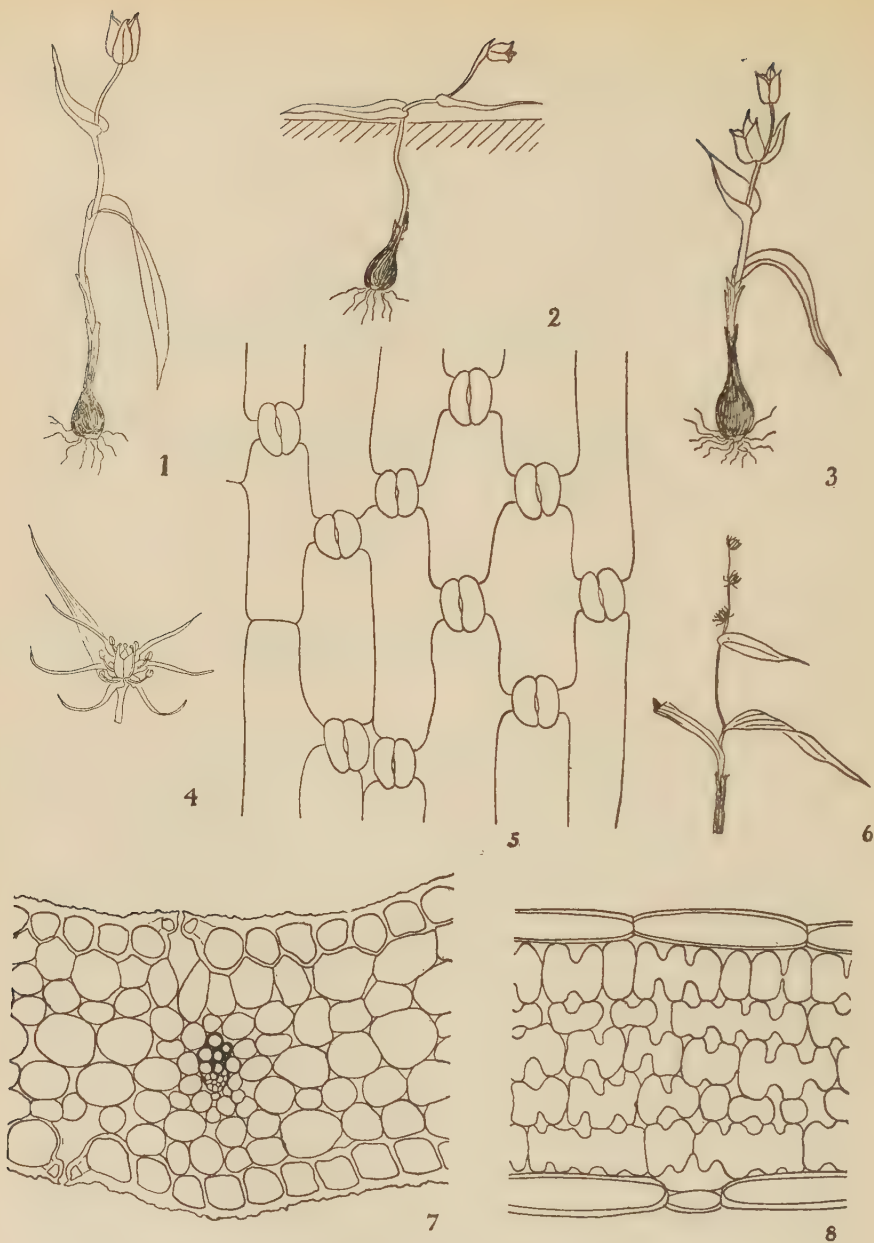


Fig. 1. An erect plant with a terminal fruit, $\times 1$.

Fig. 2. A prostrate plant, the effect of phototropic curvature, $\times 1$.

Fig. 3. A plant with three leaves, the uppermost leaf simulating a bract, $\times 1$.

Fig. 4. A flower and upper leaf. From Hooker's *Icones* 2931.

Fig. 5. A small portion of the upper epidermis from the middle of the lowest leaf, $\times 250$.

Fig. 6. Upper portion of a plant with three flowers, showing internode between lowest flower and uppermost leaf, $\times 1$. (Duthie. 1131).

Fig. 7. Transverse section of lowest leaf, $\times 250$.

Fig. 8. Longitudinal section of lowest leaf, $\times 250$.

side, forming a flattened, oval scale, devoid of starch, and bearing at its base the adventitious roots (Fig. 12, R) which have been produced below the bud which has developed into a new corm. The branch system is therefore sympodial.

The foliage leaves are usually two in number (Figs. 1, 2 and 3). The lower leaf has a sheathing base which covers the corm; its lamina (20 to 25 mm. long, 3 to 4 mm. wide) often extending along the surface of the soil in the fruiting plants examined at Parel Vallei. The upper leaf is amplexicaul, its lamina is smaller, and owing to the frequent obliquity of the stem, it also is sometimes almost in contact with the ground (Fig. 2).

The lower leaf has a thin lamina, with a well marked median vein, and about four smaller veins parallel to it in each half of the lamina,

The anatomy of the leaf is that characteristic of shade plants the mesophyll being 6 or 7 cells in thickness, a slightly differentiated palisade layer of elongated lobed cells being developed towards the upper (adaxial) surface (Figs 7 and 8). In transverse sections all the mesophyll cells appear circular in outline, and there are numerous intercellular spaces (Fig. 7).

The stomata (Fig. 5) are small, but very numerous on both surfaces of the leaf.

Counts were made from portions of both the upper and lower epidermis taken from the middle of the lower leaf, a little to one side of the midrib.

The upper (adaxial) epidermis was found to have 173 stomata per sq. mm., the stomatal index being 35.1, the corresponding lower epidermis having 133 stomata per sq. mm., and a stomatal index of 28.3.

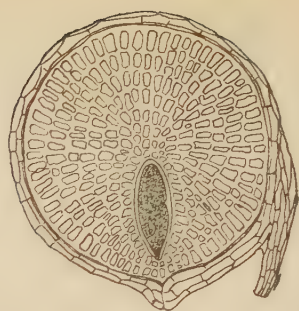
Salisbury (1927) considers that a low stomatal index is characteristic of aquatics, whilst plants of drier habitats are characterised by higher indices, though he points out that comparatively few plants have as yet been examined from this point of view.

The mean stomatal index as given by Salisbury for the European *Scilla nutans* is 27.4, and for *Iris foetidissima* 34.5, both being woodland plants, these indices approximating to that of *Neodregea*, 31.7, which may also be considered as a plant of dry woodlands.

The inflorescence of *Neodregea* has some puzzling features. Wright (1909) described the plant as having a lower, sheathing leaf, and an upper, amplexicaul leaf, a spike of two to four flowers, and bracts similar to foliage leaves but smaller. If an inflorescence is carefully examined (Fig. 3), it will be seen that the lower flower does not stand in the axil of the "bract," but appears to be terminal, with a lateral pedicel in the axil of the "bract." Thus the branching would appear to be cymose. However, in examples bearing three flowers (Fig. 6) there is occasionally an internode between the "bract" and the first of the three flowers, and all the flowers are bractless. It seems therefore that the so-called "bract" is only a small upper leaf, which bears no flower in its axil, but which



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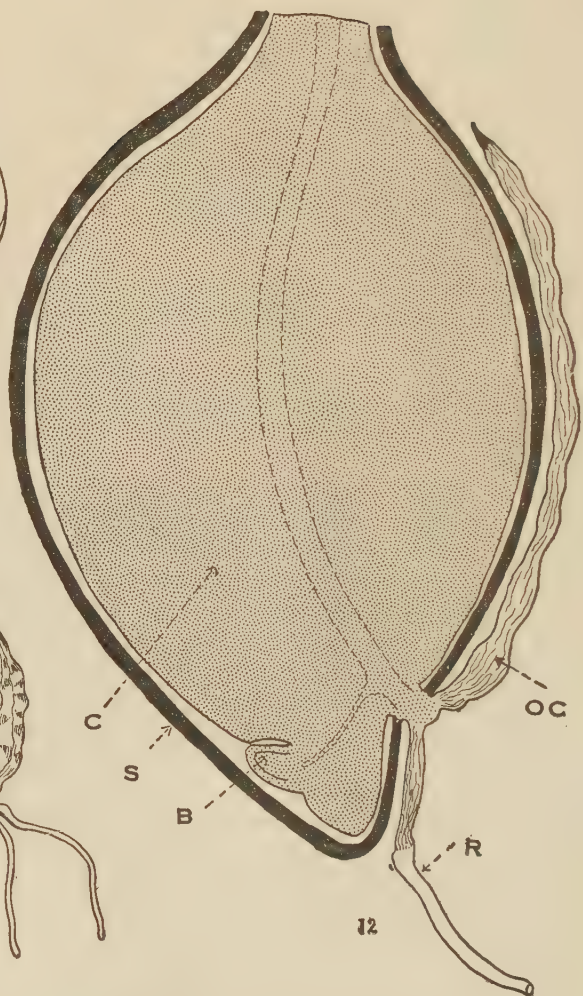
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11a



12

Fig. 9. The seed, showing micropyle and funiculus, $\times 50$.

Fig. 10. Section of seed and upper part of funiculus, $\times 50$.

Fig. 11. Corm, with dead leaf bases, and all old corms except one removed, $\times 5$.

gives the appearance of cymose branching when the internode between it and the lowest flower is suppressed. When there is a solitary, terminal flower, the leaf is often very reduced, and situated immediately below it (Fig. 2).

In the raceme of *Baeometra* also, the uppermost leaf is reduced and in a similar manner approaches the lowest flower; hence the description given by Baker (1897), "Bracts subulate."

Hutchinson (1934) who has recently revised and amended the section *Anguillarieae* Don. of the *Liliaceae*, gives the ebracteate inflorescence as a common character of the included genera, *Baeometra*, *Anguillaria*, *Neodregea*, *Dipidax* and *Wurmbea*.

These genera, with the exception of *Dipidax*, all have corms, and are all South African. *Dipidax*, which is Australian, is described as having a bulb, but requires re-examination, as it would appear to form an exception in an otherwise very natural group of genera.

The seeds of *Neodregea* were described as lenticular in shape (Wright 1909), perhaps because in the original specimens the fruits were young and contained only immature, shrunken seeds. This error has been copied into numerous texts, and Marloth (1915) made it one of the diagnostic characters of *Neodregea* in his key to the genera of the *Liliaceae*.

The mature seed however, is quite spherical, .7 mm. in diameter, the brown finely reticulate testa having a low ridge joining the small, papilliform micropyle to the point of attachment of the funiculus (Fig. 9).

The copious endosperm consists of cells which radiate away in rows from the almost starch-free and relatively large embryo which is situated in the micropylar half of the seed. The endosperm cells have thick cellulose walls, and contain abundant protein granules and oil drops.

There is a long, delicate funiculus attaching the seed to the margin of the carpel.

SUMMARY.

A re-examination of *Neodregea Glassii* C. H. Wright, from a new locality (Somerset West) has shown that it is a shade plant growing underneath veld bushes. Contrary to the original description, the rootstock is a corm, the inflorescence ebracteate, and the seeds spherical.

Fig. 11a. The same, viewed from the side and showing the aerial stem, $\times 5$. Fig. 12. Longitudinal section of the corm through the plane of symmetry, $\times 15$. B, bud of next year's shoot. C, corm of present year; the upper portion is continued into the leafy stem (not shown). OC, old corm of previous year. R, functional adventitious roots at base of old corm. S, leaf sheath of lowest leaf of present year. All old leaf bases of previous years removed.

All figures except Figs. 4 and 6 drawn from *Garside* 4053. Figs. 1, 2, and 3 are from living plants. Fig. 6 is from herbarium material.

EMENDED DESCRIPTION.

Neodregea Glassii C. H. Wright (descr. emend.). Cormus ovoideus. Folia 3; folium inferius longe vaginans, medium amplexicaule, superius bracteam simulans. Flos terminalis, solitarius aut spica floribus 2-4 distantibus composita; bractee nullae. Semina per loculos singulos 4-6, sphaerica, valvarum marginibus interioribus utrinque affixa.

MATERIAL EXAMINED.

- Drège, J. L. Cradock Place and Baakens River, Port Elizabeth. May 27, 1909.
Paterson, F. 1162. Bethelsdorp. Aug. 1916.
Garside, S. 4053. Parel Vallei, Somerset West. Fruiting. Aug. 22, 1929.
Duthie, A. V. 1131. Belvidere Church, Knysna. Flowering. June, 1931.
Garside, S. 4195. Parel Vallei, Somerset West. Fruiting. Sep. 12, 1932.

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XXVII—MELANESIAN PLANTS: I. B. L. BURTT.

During the years 1929-1932 Mr. J. H. L. Waterhouse collected extensively in the Solomon Islands on behalf of Kew, with the aid of a grant from the Empire Marketing Board. His first collections were made in the British Solomon Islands, chiefly in New Georgia, but also in adjacent small islands. Later he collected in Bougainville Island (in the Mandated Territory of New Guinea), partly in the small island of Buka and the adjoining mainland in the north-west, and partly at Siwai in the south-west. Material from these sources was also sent to Prof. S. J. Record of the Yale School of Forestry who has forwarded it to Kew for identification. Corresponding material in the main collection was also examined, and during the work a number of new species have been discovered,

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some of which are described in the following paper. It is hoped to publish others later and the results of investigations carried out on plants from other Pacific Islands will be incorporated as seems convenient.

In the citation of specimens the letter Y prefixed to a number indicates that the specimen was received from Yale. The New Georgia collections are without a prefix-letter, but those received direct from Bougainville are distinguished by the letter B: a Y in brackets after such a number indicates that it was also received through Prof. Record and represents the same collecting.

Dillenia ingens B. L. Burtt [Dilleniaceae]; species nova *D. calothyrsae* Diels maxime affinis, sed floribus foliisque multo maioribus, stipulis suborbicularibus et petiolo subtus haud acute carinato facile distinguitur.

Arbor c. 9 m. alta. *Stipulae* deciduae, magnae, suborbiculares, 4-5 cm. longae, 5.5 cm. latae, petiolo adnatae, extra dense lanatae. *Folia* alterna, magna, petiolata; petiolus 4-5 cm. longus, basi uti stipulae lanatus, glabrescens; lamina elliptica, 50-80 cm. longa, 25-40 cm. lata, pilis paucis subtus in costa exceptis glabra, ad basin plus minusve abrupte angustata, ad mucronem apicalem rotundata, marginibus leviter crenato-serrata; nervi laterales c. 30, validi, in media lamina inter se 2 cm. distantes, ad apicem atque basin propiores, angulo semirecto ascendentes, c. 5 mm. intra marginem furcati. *Flores* 5-6 in racemum flexuosum axillare dispositi. *Sepala* 5, libera, late elliptica, scaphiformia, c. 4 cm. longa et 4.5 cm. lata, post anthesin carnosio-incrassata carpella includentia. *Petala* non visa. *Stamina* numerosa filiformia, 2 cm. longa, glabra, flaccida tantum visa. *Carpella* 10, axe cohaerentia, 1 cm. alta, in stylos 1.5-2 cm. longos producta, glabra. *Ovula* ex carpelli angulo interiore biseriata, c. 14, arillata, glabra. *Fructus* juvenilis (i.e. carpella sepalis persistentibus inclusa) 3.5 cm. diametro.

SOLOMON ISLANDS. Bougainville Island, Siwai, "a small tree (to about 30 ft.) with large leaves and fruit suggestive of small rosy red apples in appearance," Aug. 1931, *Waterhouse* B.510 (type); "tree about 40-50 ft., very handsome with large dark-green leaves and brightly coloured buds like small rosy and yellow apples; wood splits easily and said to harden with age," 1932, *Waterhouse* Y.25. Solomon Islands, chiefly New Georgia, 1894-95, *Officers of H.M.S. "Penguin."*

Vernacular names, *kauhana* (Siwai); *hebere* (Roviana, New Georgia).

It is unfortunate that the material of *D. ingens* consists of leaves and young fruits only, but, as it is easily distinguished from *D. calothyrsa* Diels by the characters given in the diagnosis, it seems safe to describe it as a new species. The petals are probably, as in other members of the genus, large, thin and soon caducous. After flowering the sepals close over once more and become fleshy; the

young fruits, therefore, look very like buds, but on opening them the withered stamens are found inside and there are no petals.

In the present state of our knowledge it seems advisable to describe this plant as a *Dillenia*, but if the genus *Wormia* shall eventually be found distinct, *D. ingens* may have to be transferred to it. *Dillenia* is distinguished in the Genera Plantarum¹. by having its carpels coherent at the axis: in *Wormia* they are free. Martelli², however, did not consider this a sufficient distinction and united the two genera under the earlier name *Dillenia*, a course which was followed by Diels³ in his account of the New Guinea species. Gilg and Werdermann⁴ retained both genera, emphasising as the distinguishing character not so much the coherence of the carpels as the presence of an aril around the seed in *Wormia* and its absence in *Dillenia*. In general facies, however, the two genera are so much alike that it seems probable that this classification will be found artificial and for that reason the genera are treated as synonymous pending a critical revision of the group.

Melicope grandifolia B. L. Burtt [Rutaceae]; species nova trifoliolata in sectione *Entogano* Engler ob stamina alternantia breviora, calycis lobos acutos et sepala extra subaspere pubescentia iuxta *M. trachycarpam* Lauterb. verisimiliter ponenda. Cuius a descriptione floribus numerosis, petalis extus glabris, foliolis maioribus breviter acuminatis (nec longe cuspidatis) subtus in costa minute pubescentibus differt.

Arbor parva. *Folia* opposita, exstipulata, trifoliata; petiolus 10–16 cm. longus, supra leviter sulcatus, minutissime puberulus; petioluli 5 mm. longi, supra canaliculati; foliola dense pellucido-glandulosa, obovato-oblanceolata, plerumque 17–25 cm. longa et 7–10 cm. lata, terminale lateralibus paullo maius, apice breviter acuminata, ad basin longe cuneata, marginibus integerrimis levissime revolutis, supra sub microscopio minute sed conspicue reticulata, utrinque sparsissime pilis minutis instructis. *Flores* unisexuales. *Inflorescentia* ♂ e paniculis axillaribus ad apices ramorum versus petiolis aequilongis; axis et rami breviter pubescentes; rami oppositi, bracteis 0.5 mm. longis suffulti; flores 3–5 in pedunculo 1–3 mm. longo specie umbellati, pedicellis 2 mm. longis bracteis minutis suffultis. *Calyx* 1 mm. longus ultra medium 4 lobatus, lobis deltoideis acutis, extra pubescens. *Petala* 4, libera, elliptica, 2.5 mm. longa, 1.25 mm. lata, apice inflexo-mucronata, apicibus ipsis pubescentibus exceptis glabra. *Stamina* 8, omnia fertilia, 4 petalis opposita minora 2 mm. longa, 4 petalis alternantia 2.5 mm. longa, filamentis complanatis a basi ad apicem angustatis glabris, antheris 0.5 mm. longitudinis haud attingentibus. *Discus* crassus,

¹ Benth. and Hook. fil., *Genera Plantarum*, **1**, 13 (1862).

² Martelli in Beccari, *Malesia*, **3**, 154 (1886).

³ Diels in Engl. Bot. Jahrb. **57**, 436 (1922).

⁴ Gilg and Werdermann in Engl. u. Prantl, *Natürl. Pflanzenfam.* **2** Aufl., **21**, 33 (1925).

8-lobatus. *Gynaecium* inchoatum. *Inflorescentia* ♀ c. 15 cm. longa, ramosa, floribus in fasciculas oppositas dispositis; pedicelli 1 mm. longi, bracteis suffulcentibus longiores; calyx et petala ut in flore ♂ *Stamina* inchoata parva. *Discus* parvus. *Ovarium* 1 mm. altum, pubescens, conspicue 4-lobatum, 4-loculare, ovulis in loculis 2 superpositis. *Fructus* ignotus.

SOLOMON ISLANDS. Bougainville Island, Siwai, "a tree with masses of small creamy yellow blossom," Aug. 1930, *Waterhouse* B.227 (Y.122).

Vernacular name, *hongoponipo*.

***Fagara megistophylla* B. L. Burt** [Rutaceae-Xanthoxyleae]; species nova inter species gerontogaeas (asiaticas et australienses) subsectionis *Paniculatarum* sectionis *Macqueriae*¹ ob folia et inflorescentiam permagnam praestans. Iuxta *F. giganteam* Handel-Mazzetti, quam non vidi, et *F. integrifoliolam* Merrill verisimiliter ponenda.

Arbuscula vel arbor parva, dioica, inermis. *Folia* alterna, permagna, imparipinnata, usque ad 90 cm. longa; petiolus 10–25 cm. longus, c. 5 mm. crassus, glaber; foliola 4-jugis, lateralia basi inaequalia, petiolulis c. 5 mm. longis instructis, infima c. 12 cm. longa et 8 cm. lata, ad apicem versus rotundata, breviter acuminata, basi rotundata, superiora gradatim maiora, supremi iugi oblongo-elliptica, ad 35 cm. longa et 13 cm. lata, basi plus minusve rotundata, apice acuminata; terminale etiam maius, rhachidis suprema parte cum petiolulo 7–9 cm. longa; omnia integerrima, glabra, supra nitentia, pellucido-punctata; rhachis glabra, partibus interiugalibus c. 14 cm. longis. *Inflorescentia* axillaris ♂ et ♀ consimiles, ad 30 cm. (statu fructifero) longa, dimidio superiore ramosa, ramis c. 10 cm. longis iterum ramosis. *Flores* utrius sexus in alabastro tantum visi. *Alabastra* ♂ 2.5 mm. longa, pedicello 0.5 mm. longo, calyce leviter 4-lobato vix 1.5 mm. longo, petalis 4 imbricatis c. 2.5 mm. longis, staminibus 4, filamentis vix 1 mm. longis, antheris dorsifixis 1.5 mm. longis, ovarii rudimento perparvo. *Alabastra* ♀ calyce petalisque ut in flore ♂, staminibus nullis, ovario e carpellis duobus ima basi et stigmatibus leviter cohaerentibus cetera liberis c. 1.5 mm. longis, stylis sublateralibus, stigmatibus capitatis, 0.5 mm. longis instructis. *Fructus* carpello uno saepe abortivo, altero c. 1 cm. longo, medio dehiscente, semine uno nigro nitente.

SOLOMON ISLANDS. Bougainville Island, Siwai, "small tree about 30 ft., with clusters of small black seeds," Dec. 1932, *Waterhouse* Y. 167 (♀ buds and fruits); "a shrub or small tree with masses of black seeds," Oct. 1930, *Waterhouse* B.344 (fruits: type); "small tree 15–20 ft.," Jan. 1932, *Waterhouse* Y.5 (♂ buds).

Vernacular name, *kiha*.

F. megistophylla is remarkable for the large size of its leaves, and on this account I am unable to find any close affinity for it. It

¹ See Engler in Engler u. Prantl, *Natürl. Pflanzenfam.* 2 Aufl. 19 A. 217 (1931).

also differs from most of the asiatic species, including *F. integrifoliola* Merrill, to which it may otherwise be allied, in not producing thorns or prickles.

Canarium salomonense B. L. Burtt [Burseraceae]; species nova ad subsectionem *Auriculatorum* sectionis *Regressivorum*¹ referenda. *C. Harveyi* Seem., speciei tongensi, proxima sed foliolis paucioribus et latoribus abrupte breviter et obtuse acuminatis differt. *C. quadrangulari* H. J. Lam et *C. lian* H. J. Lam etiam affinis, ab illo foliolis latitudine sua nunquam duplo longioribus fructibusque maioribus, ab huius descriptione, specimine a me non viso, floribus maioribus et pseudostipulis minoribus recedit.

Arbor c. 18 m. alta, ramulis novellis, cum petiolis et rhachidibus et inflorescentiis, griseis striatis minute pubescentibus. *Folia* alterna, imparipinnata; petiolus 4.5–8 cm. longus, pseudo-stipulis c. 3 mm. longis et 2 mm. latis extra pubescentibus ramulo 1–1.5 cm. distante praeditus, parte inferiore supra leviter canaliculatus, parte superiore subteres; rhachis 2.5–4.5 cm. longa; foliola biuga, lateralia petiolulis 1–2 cm. longis instructa, terminale petiolulo 2.5–4 cm. longo, petiolulis apice incrassatis; foliola omnia plus minusve eiusdem formae, ovata ad late elliptica, plerumque 8–14 cm. longa et 5–9 cm. lata, apice in acumen obtusum c. 5 mm. longum subabrupte angustata, basi rotundata, marginibus integerrimis, supra nitida, utrinque oculo nudo glabra, sed sub microscopio foliola iuniora pilis minutis hyalinis instrui videntur; costa subtus prominens, striata, supra prominula; nervi laterales c. 10, rete venarum utrinque prominulo. *Inflorescentia* (♀?) terminalis, ramosa, c. 20 cm. longa, ramis ad 6 cm. longis, floribus pedicellis c. 3 mm. longis instructis. *Calyx* crassus, tubo 2.5 mm. longo,² lobis 3 l. mm. longis basi fere 4 mm. latis, extra breviter ferrugineo-pubescentis, intus glaber. *Petala* 3, libera, 7 mm. longa, 5 mm. lata, apice incrassato-inflexo-mucronata, intus glabra, extra dorso appresse pubescentia. *Stamina* 6 (? fertilia), filamentis 2 mm. longis glabris, antheris 2 mm. longis. *Discus* 6-lobatus, lobis staminibus alternantibus apice irregulariter dentatis 2 mm. altis. *Ovarium* glabrum in receptaculo concavo, cum stylo et stigmatibus 5 mm. altum; pars basalis 1 mm. longa, cylindrica, 1 mm. diametro, supra in partem crassam 2 mm. altam 2.5 mm. diametro subito dilatata, haec in stylum 1 mm. longum stigmatibus 3 coronatum iterum abrupte angustata; stigmata in lateribus minute ferrugineo-pubescentia; ovarii loculi 3, in parte basali locati, uniovulati. *Fructus* c. 3 cm. longus et 2 cm. diametro, pericarpio carnoso, putamine osseo, calyce persistente suffultus.

¹ H. J. Lam in Bull. Jard. Bot. Buitenzorg, ser. III. **12**, 425 (1932).

² This measurement is taken internally from the attachment of the petals to the base of the sinus between the calyx lobes. Externally the hollow receptacle is indistinguishable from the calyx tube, which thus appears about 4 mm. long.

SOLOMON ISLANDS. Bougainville Island ; Maisua, 18 Sept., 1931, *Waterhouse* B.545 (buds) ; Tonu, Siwai, "a tree about 60 ft. high and 4 ft. in circumference," fruits in September, 1932, flowers from same tree, undated, *Waterhouse* B.725 (Y.73 : type).

Vernacular name, *kuhurima*.

From an examination of the dried flowers described there is no evidence that they are not hermaphrodite, the stamens and anthers being well-developed. Lam, however, states that all the species of *Canarium* are dioecious, and as the stamens are more or less strongly developed in the female flowers of some species, it is probable that further collecting will show that *C. salomonense* is also dioecious. The hollow receptacle described here is said by Lam to be more developed in female than in male flowers.

Vavaea bougainvillensis B. L. Burtt [Meliaceae] ; species nova ad *V. pilosam* Merrill, speciem philippinensem, maxime accedit sed foliis magis obtusis, petiolis brevioribus et calycis lobis brevioribus et latioribus distinguitur.

Arbor 7.5–9 m. alta. *Ramuli* partibus hornotinis pilis c. 1 mm. longis recte patentibus densissime vestiti, foliati et inflorescentias axillares gerentes, partibus annotinis glabrescentibus, cicatricibus foliorum et inflorescentiarum delapsorum notati, partibus vetustioribus cortice corrugato fere glabri. *Folia* ad apices ramorum versus disposita, petiolata ; petiolus c. 1.2 cm. longus, densissime pilosus ; lamina late oblanceolata vel obovata, plerumque 15–20 cm. longa, 9–10 cm. lata, apice plus minusve rotundata ad acuta, plerumque breviter et late acuminata costa in mucronem excurrente, ad basin versus sensim vel abrupte angustata, marginibus integerrimis leviter undulatis, utraque facie et marginibus tenuiter, in costa et nervis dense, pilis mollibus fere 1 mm. longis vestita ; nervi laterales utrinque 12–17, ad basin laminae angulo fere recto, ad apicem angulo c. 60° patentem, intra marginem arcuati, subtus prominentes. *Flores* cymosi, ad apicem pedunculi axillaris dispositi ; inflorescentia 5 cm. diametro haud excedens ; pedunculus 4–9 cm. longus, ut pedicelli pilis recte patentibus densissime vestitus. *Calyx* 2 mm. longus, leviter 4-lobatus, extra pubescens. *Petala* 4, valvata, crassa, 7 mm. longa et 4 mm. lata, apice inflexo-mucronata, utrinque brevissime pubescentia. *Tubus staminum* in lacinias c. 13 inaequales antheriferas intus dense barbatus divisus ; cum antheris 3 mm. altus. *Discus* parvus faciem interiorem tubi staminum adherens. *Ovarium* 4-loculare, ovulis in loculis solitariis, cum stylo 5 mm. altum ; ovarium et stylus dimidio inferiore villosus ; stylus dimidio superiore glaber ; stigma magnum, capitatum. *Fructus* non visus.

SOLOMON ISLANDS. Bougainville Island ; Siwai, "a small tree 25–30 ft. in height on bank of stream," Nov. 1932, *Waterhouse* B.803 (type) ; Siwai, "a tree about 25–30 ft. in height with spreading habit on bank of a frequently dry watercourse" Dec. 1932, *Waterhouse* Y.157.

Vernacular name, *mono*.

Vavaea bougainvillensis is especially interesting as it is more closely allied to *V. pilosa* Merrill from the Philippines than to any species so far described from New Guinea. Although originally regarded as typically Polynesian it now seems probable that the genus has its centre of distribution in the Philippines and Malay Islands. *V. amicorum* Benth., the type species of the genus, was described from the Tonga Islands and has since been recorded from Fiji, New Guinea and the Philippines. I have seen no material from the latter, but that from Fiji in the Kew Herbarium is probably distinct from the Tongan species, differing in its thicker leaves, smaller calyx-lobes and obtuse flower-buds. The limits of the species are not, however, easily definable, and a critical examination of all the available material is required.

In working out this species it was found that *Vavaea pauciflora* Ridley from New Guinea is antedated by a species of the same name from the Caroline Islands. The following new name is therefore proposed :—

***Vavaea oligantha* B. L. Burtt** nom. nov. *V. pauciflora* Ridley in Trans. Linn. Soc. Bot. 9, 26 (1916)—non Volken in Engl. Bot. Jahrb. 31, 465 (1901).

***Leea tetramera* B. L. Burtt** [Vitaceae] ; species nova ab illis in Nova Guinea et insulis Salomonis adhuc repertis ob staturam, flores tetrameros¹ et stipulas petiolo fere aequilongas distinguenda. In sectione *Viridiflorarum* (C. B. Clarke) Gilg² et in serie *Pycnoneurarum* (C. B. Clarke) Gilg ob serras nervis primariis numero aequales ponenda, sed ad species quasdam philippinenses, *L. congestam* Elmer *L. philippinensem* Merrill et affines, ab auctoribus ad nullam sectionem relatas, magis accedit et cum eis seriem novam, a *Pycnoneuris* nervis lateralibus distantioribus et floribus tetrameris¹ recedentem, verisimiliter effecit.

Arbor parva 6–7.5 m. lata, ramulis breviter et tenuiter ferrugineo-tomentellis. *Folia* simpliciter pinnata, petiolata, stipulata; petiolus c. 10 cm. longus supra profunde canaliculatus, subtus obtuse carinatus costis c. 7 instructus, ut rhachis et petioluli ferrugineo-furfuraceus et glandulis nigris obsitus; stipulae in alabastro connatae, petiolo fere aequilongae, deciduae; foliola 3-iuga, iugis inter se 6–8 cm. distantibus, petiolulata; petioluli laterales 8–12 mm. longi, terminalis ad 4.5 cm. longus; rhachis subteres, nodis (in sicco) constricta: foliola iugi infimi ovato-elliptica, c. 13 cm. longa et 6.5 cm. lata, duorum distalium oblango-elliptica ad 20 cm. longa et 7 cm. lata, terminale obovatum vel obovato-ellipticum, ad 20 cm. longum et 9 cm. latum, omnia discoloria, apice in acumen 1.5 cm. longum producta, basi rotundata (infima) ad angustata (terminale), marginibus distanter crenato-serrata serris nervis primariis c. 14 numero aequalibus, supra glabra, subtus parce pubescentia

¹ Very rarely a pentamerous flower is found.

² C. B. Clarke in Journ. of Bot. 19, 135 (1881). Gilg in Engl. u. Prantl, Natürl. Pflanzenfam. 3, 5 Abt. 455 (1896).

et nigro-glandulosa. *Inflorescentia* more generis oppositifolia, ramosa, paniculata; rami, et praecipue ramuli ultimi, verrucosi et minute pubescentes; flores ad apices ramulorum 2-4-nati, pedicellis vix 2 mm. longis. *Calyx* campanulatus 4-lobatus extra parce et breviter pubescens glandulis paucis intermixtis, tubo 2.5 mm longo, lobis 1.5 mm. longis triangularibus. *Corolla* e petalis 4 valvatis, basi inter se et cum disco coniunctis parte connata 3 mm. parte libera 5-6 mm. longa, 2 mm. lata, apice callosoinflexo-mucronatis. *Stamina* 4, ut in genere filamentis inter lobos disci, antheris in alabastro intra discum inflexis; disci³ lobi 4, 4 mm. longi apice breviter bicornuti, basi extra cum petalis connatis intus in partem liberam 1.5 mm. longam prolongata. *Ovarium* glabrum, quadriloculare, ovulis in loculis solitariis, 1 mm. altum, stylo striato 3 mm. longo instructo.

SOLOMON ISLANDS. Bougainville Island, Siwai, "a small tree with white blossom, fruit much sought after by pigeons," June, 1930, *Waterhouse* B.78 (type); "a small tree about 20-25 ft." June, 1931, *Waterhouse* B.461; "a tree with heavy reddish timber," Nov. 1932, *Waterhouse* B.785 (Y.139).

Vernacular names—*kuuko*, *kuuku* or *ku'u ku'u* (Siwai); *tavuruvu* (New Britain); *bau* (Teop).

Leea tetramera is of especial interest from the phytogeographical standpoint, for, as in the case of *Vavaea bougainvillensis* described above, it shows a closer affinity with species from the Philippine Islands than with any from New Guinea. As has been suggested in the diagnosis, this plant and its allies should probably form a new section of the genus characterised by the tetramerous flowers, rather distant venation and serration and by the form of the stipules. My reason for not formally proposing this new section is that I do not feel that Clarke's primary division of the genus into two sections *Rubriflorae* and *Viridiflorae* is a suitable basis for herbarium work, unless reinforced by other characters. The form of the stipules, which can often be ascertained from the scars left when they have fallen, is a character not used by Clarke, which seems likely to prove of value when used in conjunction with those of leaves and flowers.

***Pentaspadon minutiflora* B. L. Burt** [Anacardiaceae]; species nova *P. Moskowskii* Lauterbach peraffinis sed ob flores minores et pedicellos tenues statim distinguenda.

Arbor ad 18-21 m. alta, ramulis breviter pubescentibus lenticellosis. *Folia* alterna, imparipinnata, petiolo ad 12 cm. longo brevissime pubescente vel glabrescente supra leviter applanato basin versus modice incrassato; foliola 4-5-iuga, petiolulis 2-3 mm. longis supra canaliculatis, lanceolata vel oblongo-lanceolata, apice sensim obtuse acuminata ad basin (terminali angustato excepto)

³ The morphological interpretation of this organ is uncertain and it has been variously described as disc, corona and staminal tube; the term disc is used here merely as a convenient one and does not necessarily indicate agreement with that interpretation.

rotundata, c. 8–12 cm. longa et 2–4 cm. lata, inferiora minora, subglabra, supra nitida, subtus opaca, marginibus integerrimis; nervi laterales c. 12–15 fere recte patentibus vel plus minusve ascendentes; rhachis ut petiolus pubescens, supra appanata vel leviter canaliculata; pars interiugalis c. 3 cm. longa. *Inflorescentiae* axillares, foliis aequilongae, permultiflorae, ramosae; axis, rami et pedicelli breviter pubescentes; pedicelli vix 1 mm. longi. *Calyx* 5-lobatus, vix 1 mm. longus, lobis tubo paullo longioribus obtusis irregulariter dentatis, glaber. *Petala* 5, libera, obovata, 1–5 mm. longa, 1 mm. lata, papillosa. *Stamina* fertilia 5, 0.5 mm. longa, filamentis crassis antheris paullo longioribus. *Staminodia* 5, staminibus fertilibus alternantia et dimidio breviora, apice glandulo instructo. *Discus* 10-lobatus, vix 0.25 mm. altus. *Ovarium* ovoideum, hirsutum uniloculare, uniovulatum, stylo crasso incluso 0.5 mm. altum, stigmate leviter bilobo. *Fructus* ignotus.

SOLOMON ISLANDS. Bougainville Island, Siwai, "a large spreading tree, 60–70 ft., very handsome when in full blossom, near river bank," 2 Jan., 1932, *Waterhouse* B.666 (type); "Large handsome tree to 60–70 ft., spreading foliage; masses of small creamy white blossoms; from more open country and river banks." Feb. 1932, *Waterhouse* Y.13.

Vernacular names—*siinari* (Siwai); *vitawa* (Teop).

XXVII—NOTES ON AFRICAN GRASSES : XVIII.* C. E. HUBBARD.

Crinipes longifolius C. E. Hubbard, sp. nov.; affinis *C. abyssinico* Hochst. et *C. longipedi* C. E. Hubbard, comb. nov. (*Triraphidi longipedi* Stapf et C. E. Hubbard), ab illo foliorum laminis planis latioribus, panicula laxiore, ramis longioribus, glumis paullo brevioribus, lemmatis apice integro vel breviter bisetoso, aristis longioribus, ab hoc laminis longioribus et multo latioribus planis, panicula majore densiore, spiculis minoribus 2–3-floris distinguitur.

Gramen perenne, laxae caespitosum, 0.45–1.3 m. altum; innovationes extravaginales; gemmae cataphyllis coriaceis glabris obtectae. *Culmi* erecti, validiusculi, teretes, simplices, paucinodes, glabri laevesque. *Foliorum vaginae* sparse pubescentes, demum glabrae, arcte appressae, inferiores internodiis multo longiores, superiores internodiis breviores; ligulae ad seriem ciliorum sericeorum redactae; laminae lanceolato-lineares, basin versus longe attenuatae, apice setaceo-acutae, usque ad 80 cm. longae, 5–12 mm. latae, planae, firmae, virides, glabrae vel supra laxae pilosae, marginibus scaberulis exceptis laeves. *Panicula* laxiuscula, nutans, usque ad 30 cm. longa et 7 cm. lata; rhachis gracillima, laevis, superne flexuosa; rami fasciculati, filiformes, laeves, laxae divisi, inferiores

* Continued from K. B. 1934. Page 437

usque ad 16 cm. longi ; pedicelli inaequales, 1–7 mm. longi. *Spiculae* oblongae, 5–6 mm. longae, 2–3-florae, flavido-virides vel purpureo-suffusae. *Glumae* 1-nerves, membranaceae, plerumque mucronatae, mucrone usque ad 1.5 mm. longo ; inferior anguste lanceolata, 3–3.5 mm. longa ; superior oblongo-lanceolata, 3.5–4 mm. longa. *Lemmata* oblongo-ovata (explanata), 3–4 mm. longa, apice integra vel obscure bidentata, dentis setiformibus usque ad 0.7 mm. longis, membranaceae, 3-nerve, prope margines pilis circiter 1 mm. longis ciliata ; arista stricta, 4–6 mm. longa, scaberula. *Paleae* anguste oblongae, usque ad 3.5 mm. longae, carinis apicem versus ciliatae. *Antherae* circiter 2 mm. longae. *Callus* pilis albis 1 mm. longis barbatus ; anthoecii secundi et tertii callus 1–1.5 mm. longus.

UGANDA : Bugishu ; Mt. Elgon, Bulago, on moist rock, 1860 m., August 1932, *Thomas* 296 (type) ; Butandiga, cliff-edge, 2100 m., Jan. 1918, *Dummer* 3642.

Coelachne Friesiorum *C. E. Hubbard*, sp. nov. ; affinis *C. africanae* Pilger, a qua spiculis paullo majoribus, panicula angusta plus minusve contracta, culmis brevioribus differt.

Gramen perenne (?). *Culmi* e basi procumbente ascendentes, e nodis radicales, 2.5–5 cm. alti, gracillimi, basin versus ramosi, plurinodes, glabri. *Foliorum vaginae* laxae, tenuiter striatae, internodiis plerumque paullo longiores, nodis breviter pilosae, marginibus prope os pilis paucis nonnunquam praeditae ; ligulae ad seriem ciliorum brevissimorum redactae ; laminae lanceolatae, basi angustatae, apice obtusae, 4–10 mm. longae, usque ad 3.5 mm. latae, planae, virides, glabrae, supra arcte nervosae, nervis asperulis. *Panicula* plus minusve contracta, 6–30 mm. longa ; rhachis laevis ; rami solitarii, 1–3-spiculati, usque ad 8 mm. longi, laeves ; pedicelli laterales usque ad 1 mm. longi. *Spiculae* oblongae, 3 mm. longae, pallide virides et purpureo-suffusae. *Gluma* inferior late ovato-vel late elliptico-oblonga, obtusa, usque ad 1.5 mm. longa, obscure 2–3-nervis ; gluma superior late elliptico-oblonga, obtusa, 1.5–1.8 mm. longa, tenuiter 5-nervis. *Anthoecium inferum* : lemma explanatum late ellipticum et obtusum, 2.4 mm. longum, marginibus basin versus pilis paucis exceptis glabrum, obscure 3–5-nerve ; palea lanceolato-oblonga, obtusa ; antherae 2, fere 1 mm. longae. *Rhachillae* internodium 1 mm. longum. *Anthoecium superum* : lemma explanatum ovato-ellipticum vel ellipticum, obtusum, 2 mm. longum, enerve vel obscure 3-nerve, prope margines et dorso basin versus breviter pubescens ; palea oblonga, dorso et carinis breviter pubescens.

KENYA COLONY : Mt. Aberdare, near Sattima, in swamp, *Fries* 2407.

Poecilostachys Bakeri (*Schinz*) *C. E. Hubbard*, comb. nov. *P. bromoides* Stapf in Hook. Ic. Plant. sub t. 3071 (1916). *Oplismenus bromoides* Baker in Journ. Linn. Soc., Bot. **21**, 452 (1885), non Beauv. *O. Bakeri* Schinz in Durand et Schinz, Consp. Fl. Afr. **5**, 771 (1894).

Distrib.—Madagascar.

Tristachya purpurea C. E. Hubbard, sp. nov. ; affinis *T. tristachyoidi* (Trin.) C. E. Hubbard, sed foliorum laminis anguste linearibus angustioribus, spiculis atropurpureis, gluma inferiore longiore differt.

Gramen perenne, usque ad 60 cm. altum. *Culmi* erecti, graciles, rigidi, simplices, 3–4-nodes, glabri laevesque. *Foliorum vaginæ* arcte appressae, internodiis multo breviores, nodis minute pubescentes vel glabrae, inferiores basin versus tomentosae, superne glabrae, ceterae marginibus ciliatae vel glabrae, laeves ; ligulae ad seriem ciliorum minutorum redactae ; laminae anguste lineares, subacutae, inferiores usque ad 12 cm. longae, superiores 0.6–2.5 cm. longae, convolutae vel explanatae et usque ad 2.5 mm. latae, rigidae, glabrae vel basin versus pilis paucis praeditae, marginibus scaberulis exceptis laeves. *Panicula* laxa, ovata vel oblonga, 2.5–8 cm. longa, 2–12 triades spicularum gerens ; rhachis gracilis, pilis rigidis patentibus albis e tuberculis ortis laxe setosa ; rami gracillimi, plerumque simplices, ut rhachis setosi, infra apicem curvati, usque ad 2.5 cm. longi ; pedicelli intus pubescentes, usque ad 1.5 mm. longi. *Spiculae* lanceolato-oblongae, 7–10 mm. longae, atropurpureae. *Glumae* trinerves ; inferior lanceolata vel ovato-lanceolata, 7–8 mm. longa, chartacea, nervis pilis albis patentibus usque ad 4 mm. longis e tuberculis ortis laxe setosa ; superior ovato-lanceolata, breviter biloba vel emarginata vel obtusa, mucronata, spiculae aequilonga, nervis lateralibus pilis rigidis brevibus e tuberculis ortis ciliata. *Anthoecium inferum* ♂ : lemma glumae superiori simile sed glabrum ; palea anguste oblonga, obtusa vel subacuta, 5 mm. longa. *Anthoecium superum* anguste oblongum : callus obtusus, 1 mm. longus ; lemma 4–4.5 mm. longum, bilobum, lobis in setam capillarem scaberulam usque ad 7 mm. longam attenuatis, coriaceum, 5–7-nerve, pubescens, infra lobos pilis erectis 1–1.5 mm. longis dense barbatum ; arista usque ad 2 cm. longa, columna lata complanata laxè torta 5–7 mm. longa intus minute pubescente extus laevi ; palea 4.5–5 mm. longa. *Antherae* 3, 2–2.5 mm. longae. *Ovarium* glabrum.

FRENCH GUINEA : Timbo, very common in wet places on rocky plateau, *Pobéguin* 1756 (type), 1757*.

Tristachya multinodis C. E. Hubbard, sp. nov. ; affinis *T. tristachyoidi* (Trin.) C. E. Hubbard, sed gluma inferiore glabra vel fere glabra, spiculis minoribus differt.

Gramen perenne (?). *Culmi* erecti, usque ad 75 cm. alti, graciles, simplices, usque 10-nodes, glabri laevesque. *Foliorum vaginæ* arcte appressae, inferiores marginibus ciliolatae, superiores glabrae, laeves, internodiis multo breviores ; ligulae ad seriem ciliorum minutorum redactae ; laminae anguste lanceolatae, basi contractae, acutae, usque ad 9 cm. longae et 9 mm. latae, planae vel siccitate marginibus involutae, rigidae, horizontaliter patentès, fere glabrae, laeves. *Panicula* contracta, 10 cm. longa, usque 34 triades spicularum gerens ; rhachis gracilis, scaberula ; rami erecti, tenuiter

filiformes, scabridi, simplices vel laxe divisi, apicem versus pilis rigidis albis e tuberculis ortis praediti, inferiores usque ad 5 cm. longi; pedicelli glabri, 1–2 mm. longi. *Spiculae* lanceolatae vel anguste oblongae, 6–6.5 mm. longae, pallide stramineae. *Glumae* tenuiter chartaceae, trinerves; inferior anguste ovata, acuta, 3.5–4 mm. longa, plerumque glabra, nervis scaberula; superior late lanceolata vel oblongo-lanceolata, acuta, spiculae aequilonga, glabra. *Anthoecium inferum* ♂: lemma oblongo-lanceolatum, acutum, spiculae aequilongum, trinerve, glabra; palea anguste oblonga, 3 mm. longa, carinis superne ciliolata. *Anthoecium superum* anguste oblongum: callus truncatus, 0.6 mm. longus; lemma 3 mm. longum, 2-lobum, lobis in setam capillarem scaberulam usque ad 5 mm. longam attenuatis, tenuiter coriaceum, 5-nerve, breviter pubescens, infra lobos pilis brevibus albis dense barbatum; arista usque ad 1.8 cm. longa, columna scaberula usque ad 4 mm. longa; palea 4 mm. longa. *Antherae* 3, 1–1.5 mm. longae. *Ovarium* glabrum.

SIERRA LEONE: without precise locality, *Lane-Poole* 418.

Tristachya tristachyoides (*Trin.*) *C. E. Hubbard*, comb. nov. *T. microstachya* Nees ex Steud. Syn. Pl. Glum. 1, 238 (1854). *T. tuberculata* Stapf in Kew Bull. 1897, 294. *Panicum tristachyoides* Trin. in Bull. Sci. Acad. Petersb. 1, 71 (1836).

Distrib.—Senegambia and Sierra Leone.

Panicum tristachyoides Trin. was based on an old specimen from which the fertile florets had fallen. The type in the Leningrad Herbarium consists of one piece of culm and inflorescence. The type of *Tristachya microstachya* Nees is in the Cambridge Herbarium. The locality on the sheet is "S. Leone." Steudel unfortunately mistook this for "Lima" and cited the locality as such, with the result that the species has been usually regarded as Peruvian.

Loudetia Hitchcockii *C. E. Hubbard*, sp. nov.; affinis *L. luala-baënsi* (De Wild.) *C. E. Hubbard*, comb. nov. (*Trichopterygi luala-baënsi* De Wild.), sed culmis 6–8-nodibus validioribus teretibus, spiculis et aristis longioribus differt.

Gramen perenne, e rhizomate brevi ortum, usque ad 1.7 m. altum. *Culmi* erecti, validiusculi, teretes, lignosi, glauci, simplices vel infra medium ramosi, 6–8-nodes, glabri laevesque. *Foliorum vaginae* latae, demum laxae, plerumque internodiis breviores, glabrae laevesque; ligulae ad seriem ciliorum redactae; laminae lineares, in acumen tenue attenuatae, usque ad 30 cm. longae, 4–6 mm. latae, planae, supra scaberulae, subtus laeves, marginibus scabridae. *Panicula* angusta, plus minusve contracta, usque ad 23 cm. longa et 2.5 cm. lata; rhachis inferne laevis, superne scaberula, nodis inferioribus plerumque breviter pilosa; rami erecti, scaberuli, apicem versus 3–1-spiculati, inferiores 2–3-nati, usque ad 5 cm. longi; pedicelli inaequales, usque ad 10 mm. longi. *Spiculae* lanceolatae et acuminatae vel demum anguste oblongae et hiantes,

13–20 mm. longae, flavido-virides, demum flavido-brunneae. *Glumae* chartaceae, 3-nerves, glabrae; inferior anguste ovata vel ovato-oblonga, acuta vel obtusa, spiculae aequilonga. *Anthoecium inferum* ♂: lemma glumae superiori subsimile, sed acutum vel obtusum, 5–7-nerve; palea linearis, 11–15 mm. longa, carinis apicem versus ciliolata. *Anthoecium superum* lineare: callus pungens, 2 mm. longus, pilis longis brunneis dense barbatus; lemma usque ad 13 mm. longum, bilobum, lobis tenuiter acutis 3–4 mm. longis, coriaceum, 7–9-nerve, pubescens; arista plerumque bigeniculata, usque ad 4 cm. longa, columna scaberula usque ad 2 cm. longa; palea 9–11 mm. longa. *Antherae* 3, 4–8 mm. longae.

NORTHERN RHODESIA: Kazungula Quarantine Area, 1050 m., swamp grass, *Trapnell* 960; Barotse Plain, 1060 m., *Trapnell* 1341.

SOUTHERN RHODESIA: Victoria Falls, *Hitchcock* 24193, 24229 (type).

Danthoniopsis viridis (Rendle) C. E. Hubbard, comb. nov. *Trichopteryx viridis* Rendle in Cat. Afr. Pl. Welw. 2, 216 (1899). *Danthoniopsis Gossweileri* Stapf in Hook. Ic. Plant. 31, t. 3075 (1916).

Distrib.—Angola.

Danthoniopsis wasaënsis (Vanderyst) C. E. Hubbard, comb. nov. *Trichopteryx wasaënsis* Vanderyst in Bull. Agric. Congo Belge, 11, 112 (1920).—Species *Danthoniopsis minori* Stapf et C. E. Hubbard affinis, sed culmis altioribus inferne glabris, nodis longe barbatis, panícula latiore usque ad 6.3 cm. lata, spiculis majoribus 8–10 mm. longis, gluma inferiore anguste ovata vel ovato-oblonga acuta, aristis longioribus 11–14 mm. longis differt.

BELGIAN CONGO: between Wasa and Gana, *Vanderyst* 5635.

Danthoniopsis pruinosa C. E. Hubbard var. ***gracilis*** C. E. Hubbard, var. nov.; a typo differt culmis caespitosis 70 cm. altis gracilioribus simplicibus vel inferne ramosis epruinosis, internodiis inferioribus pilosis, foliorum laminis usque ad 12 cm. longis et 5 mm. latis.

NORTHERN RHODESIA: Musha Hills, near Kanona, 1680 m., *St. Clair-Thompson* 1292.

Deschampsia caespitosa (L.) Beauv. var. ***Oliveri*** C. E. Hubbard, var. nov. *Culmi* circiter 75 cm. alti; foliorum laminae anguste lineares, pungentes, usque ad 30 cm. longae, conduplicatae vel explanatae et usque ad 3 mm. latae, rigidae, subtus asperulae, supra scabridae: panícula 20–25 cm. longa, laxa, flexuosa; spiculae 5–6 mm. longae; lemmata dorso aristam 2.5–4 mm. longam circiter medio vel supra gerentia.

UGANDA: Mt. Ruwenzori, 3000 m., *Oliver* 23, 24; Kigo Flats, 3300 m., *Fishlock and Hancock* 139 (type).

Deschampsia caespitosa (L.) Beauv. var. **Mannii** C. E. Hubbard, var. nov. Culmi 60–105 cm. alti; foliorum laminae usque ad 60 cm. longae, 4–5 mm. latae, planae, subtus asperulae, supra scaberrimae; panicula 32–42 cm. longa, laxa; spiculae pallidae, 4–5 mm. longae; lemmata 3–3.5 mm. longa, basin versus aristata; arista 3–4 mm. longa.

FERNANDO Po: Clarence Peak, 2700–3000 m., Mann 322 (type), 1464.

XXIX—CONTRIBUTIONS TO THE FLORA OF TROPICAL AMERICA: XXIV.* N. Y. SANDWITH.

REVIEW OF THE SPECIES OF *BYRSONIMA* OCCURRING IN BRITISH GUIANA.

The working out of a new species of *Byrsonima* necessitated a rearrangement of the whole of the Kew material of this genus in accordance with Niedenzu's Monograph in Engler, Pflanzenreich, iv. 141, pars ii (1928). Special attention was paid to the representatives of the genus occurring in British Guiana, with the result that a key was drawn up for distinguishing the twelve species found in the Kew material. This key, which follows these remarks, is designed for the use of both field workers and herbarium botanists, and assumes that notes on colour of flowers and height of plant will always be present on the labels of the intelligent collectors of the future. The treatment departs from or supplements that of Niedenzu's monograph of the genus in the following noteworthy respects:

1. Niedenzu's genus *Alcoceratothrix* is not regarded as worthy of generic segregation, and *A. rugosa* (Benth.) Ndz. is restored to its original position in *Byrsonima*.

2. *B. ceranthera* Benth. is reduced to *B. gymnocalycina* Juss., the only discrepancy between the type collections being the presence or absence of glands on the calyx.

3. *B. sessilifolia* Benth., based on Robert Schomburgk, 1st coll. without number, is reduced to *B. coccolobifolia* H.B.K. Niedenzu neither saw nor cited the type specimen of *B. sessilifolia* at Kew, which does not in the least resemble his own Brazilian varieties α *minarum* and β *cearensis*.

4. *B. Aerugo* Sagot, which Niedenzu placed at the head of his "species incertae," is upheld, on the evidence of Sagot's description and specimens, as apparently the earliest specific name for the rain-forest tree with yellow flowers, leaves rusty beneath, and relatively long and narrow bracts which are conspicuously curled downwards on the rhachis. Specimens of this have been passing for nearly a century under the name *B. altissima* (Aubl.) H.B.K.—

* Continued from K.B. 1935, 132.

a combination more correctly cited as *B. altissima* (Aubl.) DC. Prodr. 1, 579 (1824) since it was not validly made by Kunth who merely placed the species in a list of *Malpighiae* referable to the genus *Byrsonima*, see Nov. Gen. et Sp. Pl. 5, 147 (1821)—and no one in recent years seems to have questioned the identification. *B. altissima* DC. was based on *Malpighia altissima* Aubl. Hist. Pl. Guiane, 455, t. 181, de Candolle giving a very short description adapted from Aublet, and omitting the sign (v.s.) which would have indicated that he had seen dried material. Aublet described the flowers of his 60–80 ft. tree as white, and remarked that the peduncles were furnished at the base with “deux petites écailles.” These may or may not refer to the bracteoles alone, as distinct from the bract; in any case, all that can be seen in Aublet’s figure at the base of each pedicel is a short and relatively broad organ which is arcuate-ascending. Now there is an Aublet specimen in the British Museum Herbarium which has been written up as *Malpighia altissima* Aubl. and labelled “Type specimen” and which certainly agrees well with his description and figure. The leaves of this specimen are very similar in general characters to those of the tree which is now called *B. altissima*, but a glance at the raceme immediately upsets this identification. The bracts, instead of being long, narrow and recurved, are very short, ovate and spreading, and this is not due to mutilation or age, since the raceme is young with unexpanded buds at the apex. When Jussieu wrote his Monograph of the Malpighiaceae in 1843, he had seen this Aublet specimen and regarded *B. altissima* as doubtfully distinct from the variable *B. crassifolia*. He also considered that *B. ferruginea* H.B.K. was another species scarcely differing from *B. crassifolia*. Now *B. ferruginea* is a name which has been frequently given to collections of *B. Aerugo* (*B. altissima* auct.). Thus, Schomburgk 811 (1408) was described by Bentham in 1848 as *B. ferruginea* var. *macrophylla*, see Hook. Lond. Journ. Bot. 7, 119. The same collection was referred by Grisebach (Linnaea, 22, 5: 1849) to *B. altissima*; and finally and correctly by Sagot (Ann. Sci. Nat. sér. 6, 12, 178: 1881) to his *B. Aerugo*. Sagot noted that specimens of his new species in Herb. Paris. had been identified as both *B. ferruginea* var. and as *B. Hostmanni* Bth.; in fact, his no. 102 was distributed under the latter name. *B. ferruginea* H.B.K., from the evidence of the description and figure, is a species with small ascending bracts only 1 line long, which cannot possibly be identified with *B. Aerugo* and is perhaps correctly referred to *B. crassifolia*; while *B. Hostmanni* Benth. should now be reduced to *B. coriacea* var. *spicata*. In other words, Sagot, who had at his command the wonderfully rich material of the Paris Herbarium, with all the types of Jussieu, Poiret and H.B.K., was apparently fully justified in describing *B. Aerugo* as a new species. Unfortunately, this never became clear to Niedenzu, who accepted Grisebach’s misinterpretation of *B. altissima* and failed to find a place in his Monograph for *B. Aerugo*.

As to *B. altissima* (Aubl.) DC., whatever it may be, no material corresponding with the authentic specimen has yet been seen from British Guiana. Sagot wrote of it as a large tree collected by Aublet alone, and repeated Jussieu's statement about its close affinity with *B. crassifolia*, and the matter may be left there for the present.

The following is a list of the collections seen of *B. Aerugo* Sagot, including Niedenzu's varieties *orientalis* (French Guiana) and *occidentalis* (British Guiana) of his *B. altissima*, which do not seem worthy of distinction :

FRENCH GUIANA. Karouany, Sagot 102. Maroni, ann. 1862, *Mélinon* ; *Wachenheim* 95.

BRITISH GUIANA. Pomeroon River, *Robert Schomburgk* 811 (2nd. coll.) and *Richard Schomburgk* 1408. Tapacooma Creek, *Jenman* 6617. Demerara River, *Jenman* 5100. Moraballi Creek, Essequibo River, *Sandwith* 339, 375. Kaieteur Falls, Potaro River, *la Cruz* 4389.

5. *B. bracteolaris* Benth. was another species which was not seen by Niedenzu owing to his failure to visit or to borrow specimens from London or Paris. The type specimen has been carefully examined and the recent collections of Tate on Mount Duida, Venezuela, which were correctly referred to this species by Dr. H. A. Gleason, have been kindly lent for study by the authorities of the New York Botanical Garden. There can be no doubt at all that this species is extremely closely related to *B. concinna* Benth. The character of the indumentum of the rhachis and sepals of the inflorescence of *B. bracteolaris* is of no value, since the rhachis of *B. concinna* is by no means glabrous, and in *Ule* 8623 from the Rio Cuquenán—a collection which is obviously referable to *B. concinna* though Niedenzu cited it under *B. ligustrifolia* var. *glabra*—the sepals are rusty-pubescent on the back as in *B. bracteolaris*. The proportion of the length of the produced part of the connective to that of the loculi of the anthers of *B. bracteolaris* was either exaggerated by Bentham or was taken from one or two anthers only, and will not work when compared with that of the similar parts of *B. concinna*. The two species are so alike in general facies, as well as in their area of distribution, that one is strongly tempted to unite them under the name *bracteolaris*. Against this, however, is the evidence of the unusually small loculi of the anthers of *B. bracteolaris*, both in the type specimen and in the Tate collections from Mount Duida. Further collections of both species may produce other distinctions, or may show conclusively that they must be united.

6. *B. sericea* DC. var. *typica* Ndz. is recorded by Niedenzu from British Guiana on the strength of *Schomburgk* 144. No such specimen has been found in London and a request for the loan from Berlin has failed to produce it, so some error may be presumed. No British Guiana specimens have yet been seen which can be referred to this species.

Of the twelve species occurring in the Colony, two, *B. rugosa* and *B. Aerugo*, are plentiful in the coastal forests where they often occur as quite large trees with edible berries and are known by the Arawak name "Arakadako." *B. gymnocalycina* is frequent on the banks of the large rivers, and is an attractive small tree. The remaining species are characteristic shrubs and small trees of the savannah districts, and of low secondary growth on a sandy soil, or are confined to the sandstone mountains of the interior. *B. coccolobifolia* and *B. verbascifolia* are two widely distributed species of the savannahs of South America and the West Indies. *B. coriacea* var. *spicata* (Niedenzu's treatment is accepted here, since he has seen the type of *B. coriacea*) and *B. crassifolia* are common and extremely variable plants and apparently hybridise (see *Jenman* 2159 in *New York Bot. Gard. Herb.*); the named varieties are connected by intermediates and are of doubtful taxonomic value. *B. Schomburgkiana* is a local species of the Rupununi and Rio Branco savannahs, while *B. concinna* and *B. bracteolaris* occur at high altitudes on Roraima and other parts of the Pacaraima Range. *B. chalcophylla* is a rare and interesting endemic of Roraima at present known from only two collections, *Ule* 8624 and *im Thurn* (Set A at Kew) no. 130; the latter specimen was gathered at 5750 ft., but *Ule*'s was noted as occurring in "im unteren Walde."

KEY TO THE SPECIES OF BYRSONIMA KNOWN FROM BRITISH GUIANA.

Leaves velvety, densely greyish-woolly, large, obovate, arising from the apex of thick woody branchlets; petals yellow to orange; a low gnarled shrub of savannahs.....*verbascifolia* (L.) Rich.
Leaves not as above:

Leaves with raised and forked hairs beneath; stipules large and conspicuous, more than 1 cm. long and 5 mm. wide; petals yellow; fair-sized or tall tree.....
rugosa Benth. (*coleostachya* Griseb.)

Leaves without raised and forked hairs beneath; stipules small and inconspicuous:

Anther loculi conspicuously horned; leaves drying a dark lead colour above and reddish beneath; petals white or pink; a small riverside tree.....
gymnocalycina Juss. (*ceranthera* Benth.)

Anther loculi not horned:

Mature leaves glabrous; petals white to deep rose; shrubs:
Leaves subsessile, rounded and more or less cordate at the base, obtuse, rounded or emarginate at the apex.....
coccolobifolia H.B.K. (*sessilifolia* Benth.)

Leaves distinctly petiolate, attenuate and cuneate at the base:

Leaves commonly exceeding 9 cm. in length, very shortly and acutely cuspidate; bracts linear or linear-lanceolate..... *Schomburgkiana* Benth.

- Leaves usually less than 9 cm. long, very shortly and obtusely cuspidate, or shortly acuminate, or obtuse ; bracts ovate or ovate-lanceolate :
- Leaves oblong-lanceolate, normally acuminate, glaucescent beneath ; loculi of anthers 2 mm. long or longer **eugeniifolia** *Sandwith*
- Leaves obovate or oblanceolate, not acuminate, not glaucescent beneath :
- Loculi of anthers 1.2–1.5 mm. long..... **concinna** *Benth.*
- Loculi of anthers very short, about 1 mm. long or less, hardly up to 1.2 mm..... **bracteolaris** *Benth.*
- Mature leaves not glabrous or, if nearly so, then petals yellow ; petals bright yellow except in *B. chalcophylla* ; shrubs to large trees :
- Bracts conspicuously curled backwards ; often a large tree, the leaves reddish-rusty beneath..... **Aerugo** *Sagot* (*altissima* auct., non (Aubl.) DC.)
- Bracts not conspicuously curled backwards ; usually shrubs or small trees :
- Leaves with a persistent reddish-rusty tomentum on the lower surface ; bracts more than 3 mm. long ; petals pink ; fruit more than 1 cm. long..... **chalcophylla** *Ndz.*
- Leaves without the persistent tomentum of *B. chalcophylla* ; bracts less than 3 mm. long ; petals yellow ; fruit less than 1 cm. long :
- Leaves lanceolate, oblong-lanceolate or elliptic-lanceolate, acuminate ; parallel lateral nerves very numerous, more than 15 ; ultimate veinlets of mature leaves impressed on both surfaces but forming a very fine dark reticulation on the lower **corlacea** (*Sw.*) *DC.* var. **spicata** (*Cav.*) *Rich.*
- Leaves elliptic to obovate, obtuse, shortly cuspidate, or acute, rarely lanceolate and acuminate ; parallel lateral nerves 15 or fewer ; ultimate veinlets of mature leaves normally prominulous on both surfaces..... **crassifolia** (*L.*) *H. B.K.*

Byrsonima eugeniifolia *Sandwith* sp. nov. ; *B. concinnae* *Benth.* atque *B. bracteolari* *Bth.* affinis, foliis oblongo-lanceolatis acuminatis subtus glaucis vel glaucescentibus, nervis lateralibus rectius atque magis horizontaliter patentibus, antherarum loculis longioribus differt.

Frutex vel arbor parva, ramulis summis subteretibus tenuiter striatis plus minusve cinereis arcte adpresse pubescentibus ; internodia 1–5 cm. longa. *Stipulae* ovatae, obtusae, 2.5–3.5 mm.

longae, basi connatae, indumento ramulorum. *Folia* parva, angusta, oblongo-lanceolata; siccitate saepe conduplicata, apice breviter acuminata vel saltem sensim attenuata, basi cuneata lamina in petiolum decurrente, 3.5–7.5 cm. longa, 1.2–2.8 cm. lata, adulta coriacea, supra plus minusve nitidula, subtus siccitate etiam distincte glaucescentia et densissime lepidoto-punctulata, utrinque glaberrima, nervis lateralibus more generis *Eugeniae* valde numerosis subrectis atque subhorizontaliter patentibus utrinque tenuiter prominulis, primariis a ceteris plerumque vix distinguendis ut videtur 8–10 prope marginem arcuatim anastomosantibus, rete venularum utrinque praesertim supra conspicuo; petiolus adpresse pubescens, 4–7 mm. longus. *Inflorescentiae* simpliciter racemosae, 3–10 cm. longae, statu vivo intense rubrae; rhachis angulata atque sulcata, interdum subapplanata, dense cinereo- vel ferrugineo-pubescens; bracteae ovato-lanceolatae vel ovatae, obtusae, etiam siccitate rubrae vel nigro-purpurascens, extra semper plus minusve pubescentes, infimis subfoliaceis exceptis 2.5–4 mm. longae, 1.5–2.5 mm. latae; bracteolae similes sed minores; pedicelli flavo- vel ferrugineo-pubescentes, 6–10 mm. longi. *Sepala* glandulas intense carneas obovoideas 1.5–2 mm. longas gerentia; lamina ovato-oblonga, obtusa, apice demum recurva, 3 mm. longa, 2–2.2 mm. lata, ciliata, utrinque prope medium plus minusve pubescens necnon interdum subsericea. *Petala* lamina alba carneo-suffusa, reniformi-cordata, 4.5 mm. longa, 5.5–6.5 mm. lata; unguis 3.5–3.75 mm. longus. *Torus* pilosus. *Stamina* filamentis 2.2–2.75 mm. longis, basi excepta glabris; antherae lineari-oblongae, glabrae, loculis 2–2.2 mm. longis apice connectivo subclavato paullum (ad 0.25 mm.) superatis. *Ovarium* glabrum, 1.5–1.75 mm. diametro; styli intense carnei, 3.5–3.75 mm. longi. *Fructus* (in *Jenman* 3651) ovoideo-subglobosus, 3–3.5 mm. diametro (forsan vix maturus).

BRITISH GUIANA. In scrub savannah on white sand soil, Captain Creek, Mahaicony River, Demerara Co., April 1934, *Davis* in *Forest Dept.* no. 2387 (type): shrub with leaves glaucous below; inflorescence dark reddish; petals white flushed with pink; glands and styles deep pink; anthers black. Kaieteur Savannah, Potaro River, Feb. 1879, *im Thurn*. *Ibid.*, Sept.—Oct. 1881, *Jenman* 1024: shrub or small tree, 6–10 or more feet high. Without locality, April 1887, *Jenman* 3651.

XXX—SOME CHANGES IN PLANT-NAMES. I. H. BURKILL.

I have been asked to publish in a taxonomic journal such new names as will appear in my "Dictionary of the Economic Products of the Malay Peninsula." They are as follows:—

1. I recognise *Acroceras* Stapf (in Prain, *Fl. Trop. Afr.* 9, 621: 1920) as distinct from *Panicum* Linn. Hence *Panicum Ridleyi*

Hackel ex Ridley (in Trans. Linn. Soc. ser. 2, Bot. **3**, 400: 1893) published as a *nomen nudum*—(syns. *P. crassiapiculatum* Merrill in Philipp. Journ. Sci. **1**, suppl. p. 356: 1906, and *Acroceras Ridleyi* Stapf ex Ridley, Flora Mal. Penins. **5**, 229: 1925) becomes **Acroceras crassiapiculatum** comb. nov.

2. By the conservation of the name *Alyxia* Banks (ex R. Brown, Prodr. Flor. Nov. Holl. 469: 1810) against *Gynopogon* Forster (Char. Gen. Plant. **35**: 1776), *G. breviflorum* Kurz, For. Flora Brit. Burma, **2**, 177 (1877), requires a new name: but *A. breviflora* is not available for it, as Huerck and J. Mueller of Argau used that combination for another plant: it is suggested, therefore, that *G. breviflorum* Kurz be called **Alyxia Kurzii** nom. nov.

3. On restoring *Ceiba pentandra* var. *caribaea* Backer ex Bakhuisen van den Brink in Bull. Jard. bot. Buitenzorg, ser. **3**, **6**, 196 (1924), to specific rank it becomes **Ceiba occidentalis** comb. nov., based on its oldest name, *Bombax occidentale* Sprengel, Syst. Veg. **3**, 124 (1826).

4. By the reduction of *Tanacetum* Linn. and *Pyrethrum* Linn. to *Chrysanthemum* Linn., *T. umbelliferarum* Boissier, Diagn. Plant. Or. Nov., ser. 2, no. 3, 30 (1856), with the synonym *P. umbelliferarum* Boissier, Flora Orient. **3**, 352 (1875), becomes **Chrysanthemum umbelliferarum** comb. nov.

5. As *Corymborchis* Thouars (in Nouv. Bull. Soc. Philom. no. 19, 318: 1809) antedates *Corymbis* Thouars (Orch. Isles Afr. t. 37: 1822), *Corymbis longiflora*, Hooker fil., Flora Brit. Ind. **6**, 92 (1890), becomes **Corymborchis longiflora** comb. nov.

6. Recognising *Ervatamia* Stapf (in Dyer, Flora Trop. Afr. **4**, 126 (1902) as distinct from *Tabernaemontana* Linn., *T. dichotoma* Roxburgh, Hort. Beng. 20 (1814) and Flora Ind. **2**, 21 (1832), becomes **Ervatamia dichotoma** comb. nov.

7. For the same reason *Tabernaemontana sphaerocarpa* Blume, Bijdr. 1028 (1826) becomes **Ervatamia sphaerocarpa** comb. nov.

8. Recognising *Firmiana*, Marsigli (in Saggi, Padov. **1**, 106: 1786) as distinct from *Sterculia* Linn., *S. lychnophora* Hance in Journ. Bot. **14**, 243 (1876), becomes **Firmiana lychnophora** comb. nov.

9. As *Fissistigma* Griffith (Notul. **2**, 706: 1854), antedates *Melodorum* Hooker fil. and Thomson, (Flora Ind. **1**, 115: 1855), *M. Kingii* Boerlage in Ic. Bogor. **1**, fasc. 2, 134 (1899), becomes **Fissistigma Kingii** comb. nov.

10. As the oldest name for *Isoptera borneensis* Scheffer ex Burck, Minjak Tengkawang, 27 (1886), is *Hopea seminis* de Vriese, Minjak Tangkawang, 32 (1861), the correct name is **Isoptera seminis** comb. nov.

11. Within the genus *Karatas* Miller (Gard. Dict. ed. 6: 1752), *Bromelia serra* Grisebach in Goett. Abh. **24**, 328 (1879), with the synonym *B. argentina* Baker in Kew Bull. 1892, 194, requires a place under the name **Karatas serra** comb. nov.

12. Recognising *Languas* Koenig (in Retz. Obs. **3**, 64: 1783) as distinct from *Alpinia* Linn., *A. Allughas* Roscoe in Trans. Linn. Soc. **8**, 346 (1807) becomes **Languas Allughas** comb. nov.

13. Also, *Alpinia cannaefolia* Ridley in Journ. Roy. As. Soc. Straits branch, **32**, 174 (1899), becomes **Languas cannifolia** comb. nov.

14. Also, *Alpinia elegans* K. Schumann in Engl. Jahrb. **27**, 288 (1889), becomes **Languas elegans** comb. nov.

15. Also, *Alpinia javanica* Blume, Enum. plant. Jav. 59 (1827) becomes **Languas javanica** comb. nov.

16. Also, *Alpinia melanocarpa* Ridley in Journ. Roy. As. Soc. Straits branch, **32**, 163 (1899) becomes **Languas melanocarpa** comb. nov.

17. Also, *Alpinia padacanca* Valetton ex K. Heyne, Nutt. plant. Ned. Ind. ed. of 1922, 530, becomes **Languas padacanca** comb. nov.

18. Also, *Alpinia Rafflesiana* Wallich, Cat. lith. no. 6575 (1832) becomes **Languas Rafflesiana** comb. nov.

19. Also, *Alpinia regia* Valetton ex K. Heyne, Nutt. plant. Ned. Ind. ed. of 1922, 531 becomes **Languas regia** comb. nov.

20. Also, *Alpinia uviformis* Horaninow, Prod. Scit. 35 (1862) becomes **Languas uviformis** comb. nov.

21. As *Convolvulus crispatus* Wallich, Cat. lith. no. 1403 (1828) had not been validated by a description when Choisy in Mém. Soc. Genève, **31**, 457 (1834) described this species under the name *Ipomoea petaloidea*, if transferred to the genus *Merremia*, instead of the name *M. crispatula* Prain, Bengal plants, **2**, 730 (1903) it should bear the name **Merremia petaloidea** comb. nov.

22. On reducing the genus *Gomphia* Schreber (Gen. **1**, 291 : 1789) to *Ouratea* Aublet (Plant. Guian. **1**, 397 : 1775), *G. Hookeri* Planchon in Hooker's Lond. Journ. Bot. **6**, 3 (1847) becomes **Ouratea Hookeri** comb. nov.

23. On account of the same reduction, *Gomphia sumatrana* Wallich in Cat. lith. no. 2803 (1829) ; Hooker fil., Flora Brit. Ind. **1**, 525 (1872) ; King in Journ. As. Soc. Bengal, **62**, pt. 2, 232 (1893) non Jack in Mal. Misc. no. 5, 29 (syn. *Gomphia oblongifolia* Ridley in Kew Bull. 1925, 281) requires a new name which cannot be *Ouratea oblongifolia* because that combination has been applied by Rusby to another species. Inasmuch as Griffith described this *Ouratea* as *Ochna crocea*, it should be called **Ouratea crocea** comb. nov.

24. By reducing the genus *Pasania* Oersted (in Kjoeb. Vidensk. Meddel. 1866, 81) to *Quercus* Linn., *Pasania lampadaria* Gamble in Kew Bull. 1914, 177, becomes **Quercus lampadaria** comb. nov.

25. By the same reduction *Pasania Maingayi* Schottky in Engl. Jahrb. **47**, 627 (1912), becomes **Quercus Maingayi** comb. nov.

26. As *Phaeomeria* Lindley (Introd. Nat. Syst. ed. 2, 446 : 1836) antedates *Nicolaia* Horaninow (Prod. Scit. 1862, 32), *N. Heyneana* Valetton in Bull. Jard. bot. Buitenzorg ser. 3, **3**, 128 (1921) becomes **Phaeomeria Heyneana** comb. nov.

27. By restricting the genus *Sideroxylon* Linn. as Dubard does

(in Comptes-rend. Acad. Sci. Paris, **152**, 392 : 1911), *S. Pohlmannianum* Benthams and Hooker fil. ex F. Mueller, Census, 91 (1882) becomes **Planchonella Pohlmanniana** comb. nov.

28. As *Polychroa* Loureiro (Flora Cochinch. 559 : 1790) antedates *Pellionia* Gaudichaud (in Freycinet, Voyage Bot. 494 : 1826), *Pellionia javanica* Weddell in Arch. Mus. Paris, **8**, 280 (1855-56) becomes **Polychroa javanica** comb. nov.

29. By the reduction of the genus *Kibessia* De Candolle, Prodr. **3**, 196 (1828) to *Pternandra* Jack in Mal. Misc. **2**, append. p. 3 (1822), *K. azurea* De Candolle, loc. cit., becomes **Pternandra azurea** comb. nov.

30. As *Rinorea* Aublet (Plant. Guian. **1**, 235 : 1775, antedates *Alsodeia* Thouars (Hist. Veg. Afr. **2**, 55 : 1807), *A. Hookeriana* King in Journ. As. Soc. Beng. **58**, pt. 2, 402 (1889), becomes **Rinorea Hookeriana** comb. nov.

31. As *Trichosporum* D. Don (in Edinb. Phil. Journ. July 1822) antedates *Aeschynanthus* Jack (in Trans. Linn. Soc. **14**, 42 : 1823), *A. lamponga* Miquel, Flora Ind. Bat. Suppl. 238 and 563 (1860), becomes **Trichosporum lampongum** comb. nov.

32. Because *Cissus simplex* Blanco, Flora Filip. 72 (1836), antedates *C. pyrrhodasys* Miquel, Flora Ind. Bat. Suppl. **1**, 517 (1860), when this species is transferred to the genus *Vitis*, it does not become *V. pyrrhodasys* Ridley, Flora Mal. Penins. **1**, 476 (1922) but **Vitis simplex** comb. nov.

33. When the genera *Padbruggea* Miquel (Flora Ind. Bat. **1**, pt. 1, 150 : 1855) and *Whitfordiodendron* Elmer (Leaflets Philipp. Bot. **2**, 689 : 1910) are maintained separate, *Padbruggea pubescens* Craib in Kew Bull. 1927, 61, becomes **Whitfordiodendron pubescens** comb. nov.

XXXI- PLANTS NEW TO ASSAM: VII*. C. E. C. FISCHER.

The previously known distribution, if any, is given between the name of the plant and its locality in Assam.

Vernonia talaumifolia Hook. f. et T. var. **hirsutior** C. E. C. Fischer, var. nov. [Compositae]; a typo foliis subtus pubescentioribus, rhachidibus ramulisque panicularum pedunculique dense tomentosis, involucre majore, bracteis externe sericeo-villosis, pappo brevioris siccitate albo, acheniis minoribus pubescentibus recedit.

Type from Sikkim, Bhotan, Assam, Mishmi Hills.

Garó Hills; Chitmag, 4000 ft., frt. Nov. Mrs. N. E. Parry 966, (type in Herb. Kew). Garó name *Dogamsi* : a shrub.

This specimen was noted by Miss Kosters as "related to *V. talaumifolia* Hook.f. & T. but involucre larger and achene pubescent."

* Continued from K.B. 1934, 94.

In the type the leaves are at most pubescent on the nerves beneath and not on the rest of the face as in this variety ; the panicles and peduncles are hardly tomentose, here they are felted ; the involucre bracts are little hairy and the achenes quite glabrous. A striking contrasting feature in the dry state is the reddish-brown pappus of the type.

Veronica cana Wall. [Scrophulariaceae].

Chumba to Sikkim, China.

Delei Valley, 28° 15' N : 96° 35' E, 6000 ft. ; fls. pale, almost white, or faintly flushed with violet with very faint violet lines, mauve in bud, April, *F. Kingdon Ward* 8102, " on shady banks near streams in the temperate rain forest."

Veronica capitata Benth. [Scrophulariaceae].

Kunawar to Bhutan, W. China.

Delei Valley, 28° 21' N : 96° 37' E, 11,000 ft., fls. mauve, June, *F. Kingdon Ward* 8391, " on mud slides, rocks and earth-banks in gullies facing N."

Pinguicula alpina Linn. [Lentibulariaceae].

Europe, N.E. Asia, Himalayas in Kumaon and Sikkim.

Delei Valley, 27° 21' N : 96° 37' E, 10,000-11,000 ft., fls. white with a yellow spot in the throat, May, *F. Kingdon Ward* 8231. " on wet gneiss cliffs."

Aeschynanthus deleiensis C. E. C. Fischer, sp. nov. [Gesneriaceae] ; ab *Ae. grandiflora* Spr. foliis minoribus, floribus solitariis, pedicellis bracteis calicibusque glanduloso-hirtis differt.

A slender *epiphyte* : branchlets pale-brown, glabrous, when dry longitudinally wrinkled and transversely rugulose. *Leaves* very coriaceous, broadly lanceolate, subcaudately bluntly acuminate, rarely merely narrowed to a blunt point, base acute, 3.2-6 cm. long, 1.5-2.6 cm. wide, quite glabrous, midrib rather wide, not prominent, nerves invisible, margins narrowly cartilaginous, slightly revolute when dry ; petioles 0.5-1 cm. long. *Flowers* solitary, axillary ; pedicels slender, 0.7-1.5 cm. long, subtended by 3-4 linear-ensiform bracts 1 mm. long, pedicels, bracts, calyx and corolla on the outside more or less densely furnished with slender multicellular, mostly gland-tipped hairs. *Calyx* 1.8 cm. long ; tube narrowly campanulate, 1 cm. long ; lobes linear-ensiform, acute or subacute. *Corolla* tubular-ventricose, 4.5-5 cm. long, mouth oblique ; lobes subequal, broadly rounded. Stamens inserted about the middle of the corolla-tube, exserted ; filaments flat, glabrous below, above beset with hairs similar to those of the corolla ; anthers oblong, 2.2 mm. long, cohering in pairs at the apex. *Disc* annular, 1.2 mm. long. *Pistil* linear, eventually overtopping the stamens, glabrous below, above beset with hairs similar to those of the corolla. *Capsule* linear, glabrous, strongly curved, 15-18 cm. long, the valves everted

and complicate after dehiscence. *Seeds* oblong, granulate, minute, with a single fine silky hair at each end.

Delei Valley, 28° 21' N : 96° 37' E, 5000 ft., fls. scarlet with a short black stripe down each lobe, July, *F. Kingdon Ward* 8447, "epiphyte in thickets, often hanging in long festoons. Leaves very hard and leathery."

***Aeschynanthus linearifolia* C. E. C. Fischer**, sp. nov. [Gesneriaceae]; ab *Ae. bracteata* Wall. foliis angustis elongatis, nervis obsoletis, floribus bracteolisque minoribus recedit.

A glabrous *epiphyte* : branches fistular, grey. *Leaves* coriaceous, linear-oblongate, apex bluntly acuminate, base obtuse, midrib impressed above, very prominent below, margins narrowly cartilaginous and slightly revolute when dry, often pitted below, 5.5–10.1 cm. long, 0.8–1.3 cm. wide ; petiole channelled above, rugulose, 4–7 mm. long. *Flowers* terminal or axillary ; peduncles solitary or fascicled, 1-flowered, 0.8–2 cm. long, subtended by minute, fleshy, ovate bracts ; pedicels 5–7 mm. long, slender, subtended by 2 broadly ovate, obtuse bracteoles 0.7–1 cm. long. *Calyx* 1.2–2 cm. long ; tube 1–6 mm. long ; lobes subequal, ligulate or linear-lanceolate, obtuse or subacute. *Corolla* tubular, slightly widened upwards, more or less curved, 2.5–3.5 cm. long ; lobes subequal, broadly oblong, rounded, 4.5–5.5 mm. long, apical margins minutely ciliate. *Stamens* inserted about the middle of the corolla-tube ; filaments slender, glabrous below, beset upwards with gland-tipped hairs ; anthers shortly exserted, broadly ovate, subcordate, 2.5–3 mm. long, cohering in pairs by the apex. *Disc* annular, fleshy, 1.5 mm. long. *Pistil* linear, included, glabrous. *Fruit* (only one seen) linear, 9 cm. long, curved. *Seeds* not seen.

Delei Valley, 28° 21' N : 96° 37' E, 8000 ft., fls. July, *F. Kingdon Ward* 8470, "Epiphyte in the rain forest. Calyx scarlet, lower half of corolla bright-yellow, upper half almost scarlet, giving an orange effect in combination, the lip spotted." The bracteoles are similar in colour and texture to the calyx in the dry state.

***Elsholtzia Thompsoni* Hook.f.** [Labiatae].

Oudh.

Garro Hills : Richu, 100 ft. fls. pale-mauve, *Mrs. N. E. Parry* 1279. Garro name : *Ducra*.

***Celtis sinensis* Pers.** [Ulmaceae].

China.

Delei Valley 28° 5' N : 96° 30' E, 2000 ft., unripe frt. April, *F. Kingdon Ward* 8007, "a large deciduous tree. Bark grey, smooth, hard, thin, wood very hard, tangential section just below the bark showing a number of short tangential lines (medullary rays) on a brighter background. Abundant in the jungle and conspicuous now for its bright-green foliage."

Lloydia Forrestii Diels [Liliaceae].

W. China.

Delei Valley: Kaso, 28° 21' N: 96° 37' E, 12,000–13,000 ft. fls. July, *F. Kingdon Ward* 8403. "Petals egg-yellow, brown at the base. On alpine turf and meadow slopes on both sides of the ridge in thousands."

XXXII—COLEUS BARBATUS BENTH. E. A. BRUCE.

In the course of naming a collection of plants from Somaliland a question of the status of *Coleus barbatus* Benth. has arisen. This species was described by Bentham in Wall. Pl. As. Rar. **2**, 15 (1831), the following names being included as synonyms:—

Plectranthus Forskøhlīi Willd. Sp. Pl. **3**, 169 (1801); Bot. Mag. t. 2036 (1819), and Vahl? (1790). *P. crassifolius* Willd. l.c. (1801) and Vahl? (1790). *P. barbatus* Andr. Bot. Rep. t. 594 (1809). *P. comosus* Bot. Mag. t. 2318 (1822) and *Ocimum hadiense* et *O. zatarhendi* Forsk.? (1775).

As *hadiense* is the oldest specific epithet it should take precedence over *barbatus*, provided the plants are identical. To ascertain this, *O. hadiense* and other species of *Ocimum* were obtained on loan from Forsskaal's Herbarium, so that a critical examination of the species could be made. It was found, however, that *O. hadiense* was not identical with *C. barbatus* and should be excluded from the synonymy, as well as *P. crassifolius* and *P. comosus*. *C. barbatus* was synonymous with *Plectranthus Forskøhlai* of the Bot. Mag. but not of Vahl and of Wildenow. The epithet *barbatus*, therefore, still stands:—

Coleus barbatus Benth. in Wall, Pl. As. Rar. **2**, 15 (1831).

Plectranthus barbatus Andr. Bot. Rep. t. 594 (1809).

Plectranthus Forskøhlai Ait. Hort. Kew. **3**, 425 (1811); Bot. Mag. t. 2036 (1819).

Coleus Forskøhlīi Briq. in Engl. & Prantl. Pflanzenfam. **4**, 3a, 359 (1897).

The three specimens received as *Ocimum hadiense* Forssk. were examined with a view to establishing their relation to other species. Two of the plants appear to be the same, whilst the third, on which *Plectranthus Forskøhlai* has been written, is rather different with longer pedicels and a smaller, more glabrous calyx. These specimens were compared with Forsskaal's original description in Fl. Aegypt, Arab. 109 (1775); the first two conform more closely with it, except for the following:—

" foliis obtusis . . . " " folia ad basin pedunculi conferta." It seems probable that this part of the description refers to *Ocimum* α *Zatarhendi* Forssk.

O. hadiense, as represented by these two specimens, was then compared with Kew material and was found to be identical with *Ocimum menthifolium* Hochst. ex Benth. (1848).

Carl Christensen, in Dansk Bot. Arkiv. 4, 21 (1922), has published some notes on Forsskaal's Herbarium. He regarded *O. hadiense* Forssk. as a *Plectranthus* and made the combination *Plectranthus hadiensis* (Forssk.) C. Chr. He overlooked the fact, however, that this name had already been used by Schweinfurth for an Abyssinian plant (Wein. Ill. Gart. Zeit. 2: 1894). Christensen's combination, therefore, is invalid. I consider Forsskaal's specimen to be an *Ocimum*, as it has the characteristic decurrent calyx of that genus.

The original combination should therefore be retained as follows:—

Ocimum hadiense Forssk. Fl. Aegypt. Arab. 109 (1775).

Ocimum menthifolium Hochst. ex Benth. in DC. Prod. 12, 34 (1848).

Plectranthus hadiensis (Forssk.) C. Chr. l.c. 21 (1922) non Schweinf.

The third sheet sent out as *O. hadiense* has not been identified with any of Forsskaal's descriptions or with material in the Kew herbarium. It shows some affinity with *Orthosiphon pallidus* Royle, originally described from India, but found also in Arabia.

The specimen of *Ocimum* α *Zatarhendi* Forssk. closely conforms with Forsskaal's description. But Carl Christensen has pointed out (Dansk Bot. Arkiv. 4, 21) that "Zatarhendi" is really a generic name, and the specific name should be *aegyptiacum*, whilst that of *O.* β *Zatarhendi* should be *villosum*, as implied by Forsskaal, l.c. 115, n. 368. Christensen transfers the first species to the genus *Plectranthus* as follows:—

Plectranthus aegyptiacus (Forssk.) C. Chr. l.c. 21 (1922).

Ocimum aegyptiacum Forssk. l.c. 115, n. 368 (1775).

Ocimum α *Zatarhendi* Forssk. l.c. 109 (1775).

Plectranthus Forskalaei Vahl Symb. Bot. 1, 44 (1790).

Coleus Zatarhendi (Forssk.) Benth. Lab. Gen. et Sp. 50 (1832).

Each author since Bentham's time has assumed that Vahl's (1790) and Willdenow's (1801) descriptions of *Plectranthus Forskalaei* were different, but in reality the one is exactly a transcription of the other, and the name should be attributed to Vahl, not to Willdenow as done by Bentham.

To the above should also be added the following synonymy:—
Germanea Forskolaei Poir. Dict. Suppl. 2, 764 (1811).

Plectranthus rupestris Baker in Fl. Trop. Afr. 5, 409 (1900).

and to *Plectranthus Forskalaei* Vahl the reference:—

Willd. Sp. Pl. 3, 169 (1801).

Plectranthus madagascariensis Benth. is included in this synonymy by Christensen, but it seems to be rather different with its shorter pedicels, fewer flowers to each bract, rougher indumentum and in its geographical position.

The type of *Ocimum* β *Zatarhendi* Forssk. appears to be lost (Christensen says "non repertum"), so Forsskaal's original descrip-

tion was compared with Kew material. It was found that a specimen collected by Schweinfurth (no. 690) at Wolledje, Gebel Melhan, Arabia, and named "*Plectranthus quadridentatus*" by C. B. Clarke agreed with this description but not with the true *P. quadridentatus* Schweinfurth.

As stated above *O. β. Zatarhendi* is equal to *O. villosum* Forssk. This has been transferred by Carl Christensen to the genus *Plectranthus* and the combination *P. villosus* made. Unfortunately this is invalid, having previously been used by Sieber in Benth. Lab. Gen. et Sp. 38 (1832) and T. Cooke in Kew Bull. 1909; so a new name is necessary:—

***Plectranthus arabicus* E. A. Bruce, nom. nov.**

Ocimum β Zatarhendi Forssk. (1775).

Ocimum villosum Forssk. (1775).

Plectranthus villosus (Forssk.) C. Chr. (1922) non Sieb. nec Cooke.

XXXIII—A GRASS WITH SPIRAL PHYLLOTAXIS— *MICRAIRA SUBULIFOLIA*. W. R. PHILIPSON.

A very constant vegetative character of the *Gramineae* is the regular distichous arrangement of the leaves. Mrs. Arber, in her recent work on the *Gramineae*, states that a spiral arrangement may be superficially produced in some species by a twisting of the axis, or, as in the reed, by a slipping of the leaf sheaths over one

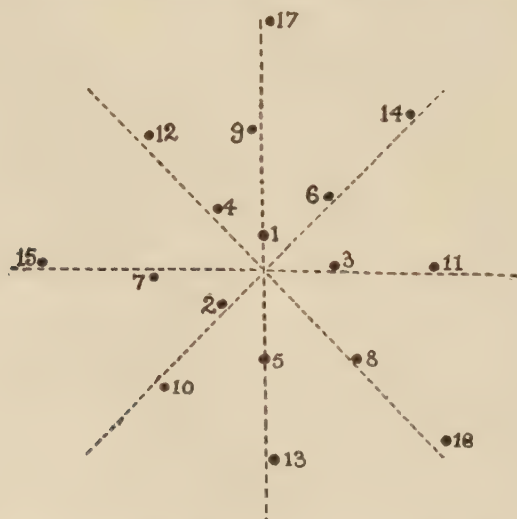


Fig 1. Transverse section passing through the youngest leaf at the apex of the stem. Positions of successive mid-ribs plotted with the camera lucida. The broken lines are separated by an angle of 45°, showing the $\frac{3}{8}$ phyllotaxis, with the 9th mid-rib on the same radius as the 1st.

another. She does not record any instance of true spiral phyllotaxis where the leaf primordia are separated from each other by less than half the circumference. The only suggestion that spiral phyllotaxis may occur in a grass which I have been able to discover, is that put forward by Weatherwax (Am. Midland Nat. **16**, 1 : 1935) to explain the structure of the female inflorescence of maize. *Strep-tochaeta spicata* Shrad. has been considered to have parts of its spikelets arranged in spirals, but close investigation by Arber (Ann. Bot. **43**, 35 : 1929) did not confirm this view.

My attention was drawn to the peculiar habit and external morphology of *Micraira subulifolia* F. Muell. by Mr. C. E. Hubbard who very kindly put at my disposal the ample herbarium material which he had collected in Queensland in 1930-31 (Glass House Mts., Mt. Ngungun, *Hubbard* 3380, 5918). The grass grows on the flat tops of volcanic mountains, creeping over the surface to form moss-like carpets. Numerous erect sterile shoots are formed with closely imbricate, spirally arranged, minute leaves. The leaves do not depart from the grass type, having a deeply furrowed blade, a row of hairs for a ligule, and a sheath which enwraps the stem. The blades are separated from the sheaths by a regular abscission layer, and become shed on the lower part of the shoot. The fine axis remains clothed with the overlapping sheaths, and adventitious roots, which form in the stem, grow downwards among the dry sheaths, finally emerging as small prop roots, which help to maintain the shoots erect.

In order to determine if the external spiral arrangement was due to an abnormal phyllotaxis or to later changes in the growth of the axis, several shoots were sectioned with the microtome. In order to soften the dried material and restore the parts as much as possible to their original form, the shoots were subjected to McLean's treatment as modified by Arber (Ann. Bot. **40**, 447 : 1926).

The sections which passed through the apices of these shoots show that the second leaf does not arise opposite the first, as in a normal grass, but slightly to one side. When the mid-ribs of successive leaves are plotted by means of the camera lucida, as in fig. 1, it is seen that the distance between them is fairly constant, and seems to approximate more nearly to $\frac{3}{8}$ the circumference of the axis than to any other of the usual schemes of phyllotaxis.

The spiral arrangement is not due to a twisting of the internodes, because the nerves of the leaves run straight through the cortex for several internodes from the point of insertion of the leaf until they fuse with the central system of bundles. Nor is it due to a twisting of the sheaths, as these are inclined straight outwards from the stem, like the feathers of a shuttle-cock.

The outer cortex becomes sclerenchymatous in the older parts of the stem, and this tissue is seen in section (fig. 2) to present eight ridges and eight depressions to the outside of the stem. It is in the region of these depressions that the leaf traces pass out.

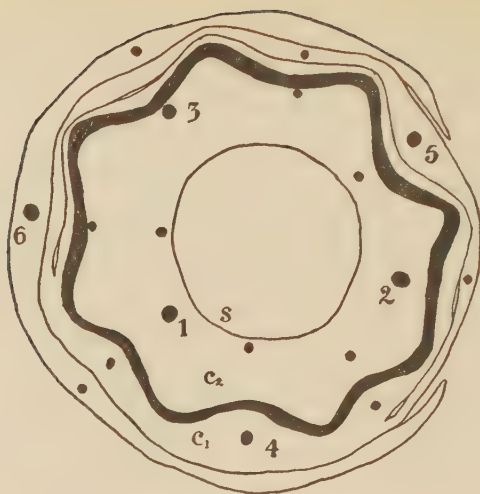


Fig. 2. Transverse section through an older part of the stem. Sclerenchymatous tissue and vascular bundles in solid black. Successive mid-ribs numbered. C_1 , C_2 , outer and inner cortex; S, central system of bundles.

and it can be seen that each mid-rib is separated from that of the preceding leaf by two of these furrows, an arrangement that results in the ninth mid-rib after that of any given leaf passing out through the same furrow, which confirms that the phyllotaxis is $\frac{2}{8}$. In the basal region of one of the shoots examined the mid-ribs appeared to be arranged in four longitudinal rows instead of eight, and it is probable that in the young plant the typical distichous arrangement is found.

This species is also aberrant in the structure of its spikelets, having a palea with six nerves instead of the two usual in grasses.

XXXIV—CONTRIBUTIONS TO THE FLORA OF SIAM.* ADDITAMENTUM XXXIX.

Iodocephalus glandulosus Kerr [Compositae—Vernonieae]; affinis *I. Eberhardtii* Gagnep., sed habitu erecto foliisque acutis differt.

Herba annua, erecta, 40–60 cm. alta. *Caulis* parce ramosus, leviter striatus, pilis brunneis T-formatis apresse hirsutus et plus minusve luteo-glanduloso-punctatus. *Folia* alterna, petiolata, lanceolata vel elliptica, apice acuta vel mucronulata, basi acuta, leviter inaequilateralia, supra viridia, subtus pallidiora, pagina utraque ad costam nervosque laterales tomentosa, aliter parce hirsuta, subtus glandulis luteis praedita, nervis lateralibus utrinque

* Continued from K.B. 1933, 30

4-6, supra subprominulis, subtus prominentibus, margine distanter minuteque mucronulo-dentata; petiolus 2-12 mm. longus; lamina 1.5-6.5 cm. longa, 0.6-2.5 cm. lata. *Inflorescentia* leviter paniculata, 3-5 capitula gerens; pedunculi capitulorum ad 2.5 cm. longi, 2-3 bracteis praediti. *Capitula* campanulata, c. 7 mm. longa, 7-8 mm. lata. *Involucri bracteae* 3-4 seriatae, ovatae vel lineari-obovatae, acutae vel sub-spinosae, exteriores gradatim breviores, dorso hirsutae glanduloso-punctataeque, 2-5.5 mm. longae, 1-1.75 mm. latae. *Flosculi* c. 20-25, leviter exserti, purpurei vel albi. *Corollae* tubus sursum leviter dilatatus, extus glandulis pilisque paucè instructus, 2.5 mm. longus; lobi 5, triangulares, 2.25 mm. longi. *Antherae* apice apiculatae, basi truncato-auriculatae. *Stylus* cum ramis 2.5 mm. longus, basi disco annulato cinctus, supra hirtellus, ramis subulatis hirtellis. *Achaenia* 2.75 mm. longa, oblongo-obovoidea, supra leviter rotundata, 10-costata, glandulis numerosis intercostalibus instructa; pappus 0. *Receptaculum* subplanum, alveolis annulis membranaceis minutis cinctis.

Doi Sutep, c. 1200 m., in evergreen forest, *Kerr* 789.

Camchaya loloana *Kerr* [Compositae—Vernonieae]; a *C. tenuiflora* *Kerr*, cui maxime affinis, involucri bracteis subappressis, setis brevioribus paucioribus ornatis, recedit.

Herba annua, circa 50-80 cm. alta. *Caulis* erectus, sulcatus, parce ramosus, ramis striatis; caulis ramique pilis medifixis appressis et glandulis parvis instructi; rami laterales breves, plus minusve 10 cm. longi. *Folia* infera lanceolata, apice subacuta, basi attenuata, margine undulata, pagina utraque glanduloso-punctata et pilis albis, rigidis, brevibus, parce instructa, ad costam nervosque hirsutiora, ad 6 cm. longa, 2.3 cm. lata; folia supera parviora, ovata, apice obtusa, basi rotundata. *Capitula* hemisphaerica, circa 0.7 cm. diametro, pedunculo 0.2-1.8 cm. longo suffulta. *Involucri bracteae* multiseriatae, subappressae, exteriores gradatim minores, lanceolatae, longe acuminatae, margine ciliatae, dorso appresso-hirsutae glandulosaeque, 3-7 mm. longae, 0.75-1.25 mm. latae; intimae oblongo-lanceolatae, apice acutissimae, margine breviter cilatae, dorso apicem versus pilis glandulisque paucis instructae, 8 mm. longae, 1 mm. latae. *Corolla* purpurea, tubo tenui apicem versus gradatim dilatato, extus glanduloso-piloso, 5 mm. longo, limbo 5-fido, lobis triangularis, 2 mm. longis. *Antherae* 1.5 mm. longae. *Styli* rami exserti. *Achaenia* longe obovata, 10-costata, glabra, 2 mm. longa; pappi setae paucissimae, caducissimae, 2 mm. longae.

Chiengdao, c. 1100 m., in open oak and pine forest, *Kerr* 6650.

The name *loloana* is an unpublished name of S. T. Dunn, written under *Vernonia*, on the Yunnan sheets of *Henry* 12375a and 12375b, which are conspecific with the Siamese plant.

Camchaya tenuiflora *Kerr* [Compositae—Vernonieae]; a *Thorelia montana* *Gagnep.* floribus longioribus acheniisque pappo interdum ornatis distinguenda.

Herba annua, erecta, circa 50 cm. alta. *Caulis* sulcatus, ramosus, ramis divaricatis, striatis; caulis ramique pilis medifixis appressis instructi. *Folia* ovato-oblonga vel ovata, apice subacuta, basi attenuata, margine undulata, ad 10 cm. longa, 3 cm. lata, superiora gradatim parviora, pagina utraque dense glanduloso-punctata parceque hirsuta, ad costam nervosque hirsutiora, nervis lateralibus utrinque 8-12, supra subprominulis, subtus prominentibus; petiolus 0.3-1 cm. longus, subamplexicaulis, supra caniculatus, margine caniculi pilis particoloratis instructus. *Capitula* terminalia axillariaque, solitaria, semiglobosa, 0.8 cm. longa, 1 cm. diametro, pedunculis 2.5-4 cm. longis. *Involucri* bractee multi-seriatae, exteriores gradatim parviores, patulae, lineari-ovatae vel lineares, longe acuminatae, margine apicem versus setis satis longis ornatae, dorso pilosae glanduloso-punctataeque, 2.5-6.5 mm. longae, 0.5-1.75 mm. latae; intimae lineari-oblongae, leviter acuminatae, dorso apicem versus pilis brevibus parce instructae, 7 mm. longae, 1.25 mm. latae. *Flosculi* 20-30. *Corolla* 5-lobata, purpurea; tubus pergracilis, extus pilis glandulosis instructus, 6 mm. longus; lobi triangulares, obtusi, glabri, 2 mm. longi. *Antherae* apice appendiculatae, appendiculis triangularis, obtusis, basi auriculatae, auriculis obtusis, 1.75 mm. longae. *Stylus* glaber, basi disco annuliformi, lobato, 0.5 mm. longo, cinctus, armis hirtellis. *Achaenia* oblongo-ovoidea, apice rotundata, glabra, eglandulosa, 10-costata, costis striatis, sulcis intercostalibus foveatis, 2 mm. longa, 0.5 mm. lata, pappo 1-2 setarum, 0.5 mm. longo, caducissimo interdum ornata. *Receptaculum* planum, nudum.

Bangkok, cultivated from seeds from Chaiyapum province, Kerr 20563.

This species is very closely allied to *Thorelia montana* Gagnep., differing from the description of that species in the points noted above. The chief distinction between *Camchaya* Gagnep. and *Thorelia* Gagnep. is the presence of a pappus in the former and not in the latter. This is not as obvious a distinction as it might seem. In the species under consideration the pappus is very scanty and fugacious, moreover it does not seem to be present in all the florets of a capitulum. In the writer's opinion *Thorelia* and *Camchaya* are too close to be kept up as distinct genera, and *Thorelia* should be sunk in *Camchaya*. In any case the name *Thorelia* was not available when proposed by Gagnepain, as it had previously been used by Hance for a myrtaceous plant, now usually regarded as a *Tristania*.

The sinking of *Thorelia* involves only one change: *Thorelia montana* Gagnep. becomes:

***Camchaya montana* (Gagnep.) Kerr, comb. nov.**

***Vernonia Craibiana* Kerr** [Compositae—Vernonieae]; *V. Chevalieri* Gagnep. similis sed foliis pro rata angustioribus, achaeniis pilosis inter alia distinguenda.

Frutex scandens; ramuli juventute brunneo-pilosi mox glabrescentes, sicco fere nigri, striati. *Folia* oblongo-ovata, apice longe

acuminata, basi cuneata vel rotundata, margine leviter undulata, ad 13 cm. longa, 3 cm. lata, juventute pagina utraque parce pilosa, cito glabrescentia, nervis lateralibus utrinque 5-7, nervis nervulisque pagina utraque conspicuis, subtus prominentibus, petiolo 0.8-1.3 cm. longo suffulta. *Capitula* in paniculas ramulos laterales terminantes disposita, c. 1 cm. longa, 0.7 cm. lata, pedunculo 1-2-bracteato, 2-4 mm. longo, suffulta. *Involucri* bracteae pluri-seriatae, ab exteriori gradatim longiores; exteriores ovatae, acutae, dorso glabrae, margine ciliatae, 2-4.5 mm. longae, 1.5-2 mm. latae; interiores oblongo-obovatae, subciliatae, 6.5 mm. longae, 1.75 mm. latae, 3-nervatae. *Receptaculum* leviter convexum, pilis brunneis instructum. *Flosculi* 8-11. *Corolla* sub-campanulata, glabra, 6.5 mm. longa, lobis 2 mm. longis, purpurea. *Antherae* 3.5 mm. longae, appendiculis obtusis, auriculis truncatis. *Stylus* basi disco breve cinctus. *Achaenia* leviter 10-costata, pilosa, 3 mm. longa; pappus 1-seriatus, rufus, 7 mm. longus.

Korat, Kao Lem, c. 700 m., climbing on trees at edge of evergreen forest, *Kerr* 9969.

***Vernonia sangka* Kerr** [Compositae—Vernonieae]; a *V. blanda* Wall. ex DC., cui affinis, involucris bracteis pro rata multo latioribus, minus acutis, differt.

Frutex scandens, ramulis leviter striatis, dense brunneo-tomentosis. *Folia* ovata vel elliptico-ovata, apice breviter acuminata, basi cuneata, inaequilateralia, margine undulata, 2.5-10 cm. longa, 1.2-4.5 cm. lata, supra ad costam nervosque laterales pilosa, aliter glabrescentia, subtus pilosa glandulo-punctataque, ad costam nervosque tomentosa, nervis lateralibus utrinque 5-7, subtus prominentibus, nervis transversis prominulis; petiolus dense tomentosus, supra caniculatus, 4-10 mm. longus. *Capitula* in ramos laterales vel terminales disposita, c. 12 mm. longa, 15 mm. lata, pedunculis 2-5 mm. longis suffulta. *Involucris* bracteae pluriseriatae; exteriores ovatae, acutiusculae, 1.5-3 mm. longae, 0.75-1 mm. latae, dense pilosae glandulisque instructae; interiores lineari-oblongae, ad 6 mm. longae, 1.5 mm. latae, apicem versus pilosae glandulosaeque. *Flosculi* 10-20, purpurei. *Corolla* 7.5 mm. longa, lobis 2 mm. longis, extus glandulis parce instructa. *Achaenia* 2.5 mm. longa, 10-costata, pilosa; pappus uniseriatus, brunneo-fulvus. *Receptaculum* nudum.

Sangka (Siam)—Samrawng (Cambodia) boundary, c. 300 m., scrub by stream, *Kerr* 8302.

***Vernonia sutepensis* Kerr** [Compositae—Vernonieae]; affinis *V. Kingii* C. B. Clarke, foliis tomentosis pro rata latioribus, inflorescentia folia excedenti, inter alia differt.

Herba erecta, ad 1 m. alta. *Caulis* striatus, interdum quadrangulatus, primo brunneo-pubescent, mox glabrescent. *Folia* elliptica vel ovato-elliptica, apice subacuta, basi late cuneata rotundatave, margine creno-dentata, ad 7 cm. longa, 3 cm. lata, supra scabrida,

subtus dense brunneo-tomentosa, praesertim ad costam nervosque, nervis lateralibus utrinque 6-8 cum nervis transversalibus subtus prominentibus, supra prominulis; petiolus 3-5 mm. longus, dense tomentosus. *Paniculae* terminales axillariaeque, folia multo excedentes. *Capitula* campanulata, 8-10 mm. diametro, circa 25 flosculos ferentia, pedunculis dense brunneo-tomentosis, 0.5-2.5 mm. longis, suffulta. *Involucri* bracteae multi-seriatae; exteriores gradatim parviores, patentes, anguste triangulares, apice acutae mucronatae, margine longe brunneo-ciliatae, dorso parce glanduloso-pilosae, 1.75 mm. longae, 0.75 mm. latae; medianae appressae, ovatae obovatae, dorso apicem versus nigro-brunneae, apice fortiter subulo-mucronatae, margine longissime brunneo-ciliatae, ad 5 mm. longae, 1.75 mm. latae; intimae lineares vel lineari-obovatae, apice tenue erosae vel breviter mucronulatae, margine integrae vel breviter ciliatae, dorso breviter parceque glanduloso-pilosae ad 12 mm. longae, 1.25 mm. latae. *Corolla* purpurea, extus parce glandulosa; tubus 10 mm. longus; lobi anguste triangulares, 2.5 mm. longi. *Antherae* 2.5 mm. longae. *Achaenia*, vix matura, 2.5 mm. longa, indistincte sulcatula, longe pilosa; pappus biseriatus, albus, 8 mm. longus. *Receptaculum* planum foveolatum, glabrum.

Doi Sutep, 1200-1650 m., common in evergreen forest, *Kerr* 3561.

***Gynura calciphila* Kerr** [Compositae—Senecionideae]; a *G. ovali* DC. foliis cordatis longe petiolatis recedit.

Herba perennis. *Caulis* succosus, 10-20 cm. longus, parce breviter crispatis pubescens, inferne nudus, superne foliosus. *Folia* late ovato-cordata, vel hastata, ad 7.5 cm. longa, 4 cm. lata, apice obtusa, basi cordata, rarius cuneata, margine grosse sinuato-dentata, pagina utraque breviter crispatis pubescentia, nervis lateralibus utrinque 4-5, obscuris; petiolus 4-6 cm. longus, tenue pubescens, basi auriculatus, auriculis lobatis. *Inflorescentia* terminalis, ex 2-6 capitulis in corymbum laxum dispositis constans, scapo 20-30 cm. longo suffulta. *Capitula* campanulata, pedunculis 1-3 cm. longis, 2-3 bracteis linearibus ornatis, suffulta. *Involucri* bracteae interiores 13, lineari-lanceolatae, 7 mm. longae, 1.5 mm. latae, margine scariosae, dorso parce pilosae; exteriores lineares, c. 3 mm. longae. *Flosculi* 50-60, bene exserti. *Corolla* lutea, c. 9 mm. longa, 5-lobata, lobis 0.75 mm. longis. *Antherae* 1.5 mm. longae, filamentis apice dilatatis suffultae. *Styli* rami 3 mm. longi, dimidio superiore hirtelli. *Achaenia* 3.5 mm. longa, 10-costata, minute punctata, glabra; pappus copiosus, albus, c. 6 mm. longus. *Receptaculum* planum, papillatum.

Chumpawn, Siepyuan, *Put* 953.

Though no particulars of the habitat of this plant are given on the label, it was almost certainly collected on the limestone hills at Siepyuan. There are several other collections of this species, all from limestone hills, where the plant is found growing in rock crevices.

Gynura longifolia Kerr [Compositae—Senecionideae]; affinis *G. bicolori* DC., foliis elongato-oblongis, distanter mucro-dentatis, petiolis auriculatis distinguenda.

Planta scandens, surculis brunneo-pubescentibus, cito vix omnino glabra. *Caulis* leviter striatus, sparsim foliosus. *Folia* elongato-oblonga, basi attenuata, rotundata, apice longe attenuata, acuta, ad 22 cm. longa, 3 cm. lata, margine distanter mucro-dentata, sicco supra nigro-fuscentia, subtus pallidiora, costa subtus parce hirsuta, aliter glabra, nervis lateralibus utrinque circa 12, supra obscuris subtus subprominulis, petiolo ad 0.5 cm. longo, supra caniculato, subtus pilis brunneis parce induto, basi utrinque auricula reniformi breviter pedicellata instructo, suffulta; folia summa imminuta. *Capitula* in corymbum laxum disposita, pedunculis 1.5–3 cm. longis, 2–4 bracteis filiformibus instructis, suffulta. *Involucri* bractee lineares acutae glabrae, interiores margine scariosae, 1 cm. longae, 0.25 cm. latae, exteriores multo breviores. *Flosculi* circa 50, bene exserti. *Corolla* lutea, 13.5 mm. longa, 5-lobata, lobis anguste triangularibus. *Antherae* semi-exsertae, 2 mm. longae, filamentis apice dilatatis suffultae. *Styli* rami 3.5 mm. longi, dimidio superiore hirtelli, demum extrusi. *Achaenia* 4.5 mm. longa, 10-costata, costis minute punctatis, sulcis breviter puberulis; pappus copiosus, albus, 12–14 mm. longus. *Receptaculum* leviter convexum, fimbriatum.

Doi Sutep, c. 1670 m., Kerr 3195.

Gynura truncata Kerr [Compositae—Senecionideae]; a *G. angulosa* DC. foliis obtuse lobatis, basi truncatis recedit.

Herba erecta, c. 1.5 m. alta. *Ramuli* valde sulcati, juventute satis dense griseo-hirsuti, mox sparse hirsuti. *Folia* superiora (inferiora non visa) sessilia, haud auriculata, lanceolata, basi truncata, apice rotundata, margine altius pinnatim lobata, lobis utrinque 7–8, rotundatis, pagina utraque minute verrucosa, sicco nigro-brunnea, supra pilis paucis, ad marginem copiosioribus, instructa, subtus pilosa glanduloso-punctataque, nervis lateralibus utrinque 7–8 inconspicuis, ad 10 cm. longa, 4 cm. lata. *Capitula* lateralialia vel terminalialia, pedunculis 4–7 cm. longis suffulta. *Involucri* bractee exteriores lineares, c. 8 mm. longae, 0.75 mm. latae, dorso parce hirsutae; interiores, 13 mm. longae, 2 mm. latae, dorso hirsutae, marginibus scariosae. *Corollae* tubus c. 15 mm. longus, glaber, sursum gradatim dilatatus; lobi 1.25 mm. longi, extus parce pilosi. *Antherae* c. 2.5 mm. longae, filamentis apicem versus dilatatis suffultae. *Styli* rami 2 mm. longi, hirtelli. *Achaenia* 10-costata, inter costas papillosa, 4 mm. longa; pappus copiosus, c. 12 mm. longus. *Receptaculum* planum papillosum.

Korat, Bua Yai, c. 200 m., in deciduous forest, Kerr 20484.

Saussurea venosa Kerr [Compositae—Cynaroideae]; affinis *S. deltoideae* C. B. Clarke, sed involucri bracteis exterioribus foliaceis, foliis caulinis intermediis sessilibus semiamplexicaulibus differt.

Herba erecta c. 50–60 cm. alta. *Caulis* striatus glandulopilosus leviterque araneosus, dimidio superiore paniculate ramificatus. *Folia* radicalia non visa; folia caulina inferiora ad 8.5 cm. longa, 4 cm. lata, petiolata, pinnatisecta, utrinque 4–5 lobis angulolobulatis, lobis lobulisque apice mucronata, margine plus minusve revoluta, petiolis ad 3.5 cm. longis, saepius plus minusve alatis, canaliculatis, basi subamplexicaulibus, suffulta; folia caulina intermedia sessilia, pinnatim lobatim, basi auriculata semiamplexicaulia; folia suprema lanceolata, margine sinuato-dentata, basi leviter auriculata; omnia supra sicco nigro-brunnea scabrida, subtus ad costam nervosque pilis resiniferis luteis crebre instructa aliter dense niveo-araneosa. *Capitula* solitaria, ramulos laterales terminantia, ad 2 cm. diametro. *Involucri* bractee exteriores foliaceae, interiores excedentes, indumento ei foliorum simili; interiores oblongo-lineares, ad 12 mm. longae, 1.25 mm. latae, apice longe attenuatae, biflectae, dorso brunneo-pilosae, margine ciliatae. *Flosculi* 20–30. *Corolla* alba, 10 mm. longa; tubus 7.5 mm. longus, apicem versus subito dilatatus; lobi 2.5 mm. longi. *Antherae* purpureo-brunneae, c. 3.5 mm. longae, exsertae, basi longe fimbriolato-caudatae. *Achaenia* c. 2.5 mm. longa, 4-angulata, ad angulos tuberculata; pappus pallide fuscus, 8 mm. longus, uniseriatus, plumosus. *Receptaculi* fimbriellae c. 8 mm. longae, achaenia multo excedentes.

Doi Chiengdao, c. 2100 m., open rocky ground, *Kerr* 6613.

***Lactuca Garrettii* Kerr** [Compositae—Cichorieae]; ab affini *L. hastata* DC. capitulis maioribus, foliis magis lobatis recedit.

Herba robusta, erecta, 50 cm. alta vel ultra. *Caulis* fistulosus, crebre striatus, juventute leviter brunneo-tomentosus, mox glabrescens, superne ramosus. *Folia* radicalia non visa; folia caulina sessilia, inaequaliter pinnatim lobata, ad 17 cm. longa, 5 cm. lata, lobo terminali ad 8 cm. longo, 3.5 cm. lato, apice longe sensimque acuminato, acuto, lobis lateralibus utrinque 1–3, obtusis, mucronatis, ad 2.5 cm. longis, 1.7 cm. latis, margine remote mucro-dentata, basi auriculata, amplexicaulia, supra glabrescentia, subtus ad costam nervosque prominentes sparsim brunneo-tomentosa. *Capitula* pedunculis 1.5–7 cm. longis, brunneo-tomentosis, suffulta. *Involucri* bractee pluri-seriatae, glabrae, introrsum sensim maiores; exteriores 3 mm. longae; interiores ad 13 mm. longae, 2 mm. latae, margine anguste scariosae. *Flosculi* c. 12, violacei (ex *Garrett*). *Corollae* tubus 5 mm. longus; ligula 12 mm. longa, 5 mm. lata. *Antherae* 5.5 mm. longae. *Achaenia* (omnia matura visa imperfecta, basi erosa) compressa, fere nigra, in rostrum pallidius c. 4.5 mm. longum sensim attenuatum, disco pappifero 0.75 mm. diametro; pappus interior albus, c. 7 mm. longus; pappus exterior ex setis brevissimis constans.

Doi Ka, Pa Ngem, 2145–2195 m., *Garrett* 68.

***Lactuca Putii* Kerr** [Compositae—Cichorieae]; species *L. hastata* DC. affinis a qua capitulis minoribus 4–5-floris differt.

Herba erecta 60 cm. alta vel ultra. *Caulis* superne paniculatum ramosus, parce crispatis brunneo-tomentosus. *Folia* radicalia non visa; folia caulina petiolata, lyrata, ad 9 cm. longa, 4·8 cm. lata, supra parce breviter pilosa, subtus brunneo-tomentosa praesertim ad costam nervosque, margine dentata, lobo terminali late ovato, breviter acuminato, ad 7 cm. longo, 4·8 cm. lato, lobis lateralibus duobus, ad 1·2 cm. altis, 1·2 cm. latis, rotundatis; petiolus plus minusve alatus, basi interdum leviter auriculatus. *Capitula* nutantia, 4-5-flora, in ramos breves laterales racemiforme disposita. *Involucri* bracteae pluriseriatae, inaequales, interiores gradatim maiores; exteriores ovatae, sub-acutae, dorso minute glandulopunctatae, 3-6 mm. longae, 1·5 mm. latae; interiores lineari-oblongae, ad 15 mm. longae, 2·5 mm. latae. *Corollae* tubus 8 mm. longus; ligula 7 mm. longa, 2 mm. lata. *Achaenia* compressa, fere nigra, supra minute hispidula, 7 mm. longa, margine incrassata, utraque facie 3-costata, basi leviter contracta, sursum in rostrum 4 mm. longum sensim attenuata, disco pappifero 0·75 mm. diametro; pappus albus, c. 6 mm. longus; pappus exterior nullus.

Doi Chiengdao, *Put* 367.

***Lactuca riparia* Kerr** [Compositae—Cichorieae]; *L. polycephalae* Benth. affinis, foliis pinnatilobatis, capitulis minoribus inter alia differt.

Herba erecta, probabiliter annua, superne ramosa, ad 40 cm. alta. *Caulis* leviter striatus. *Folia* radicalia pinnatilobata, interdum fere pinnata, petiolata, ad 12 cm. longa, petiolo incluso, 1·7 cm. lata, lobis utrinque 3-4, ovatis apiculatis, ad 0·8 cm. longis, 0·6 cm. latis, infimis multo minoribus, lobo terminali late ovato, ad 2 cm. longo, 1·5 cm. lato; petiolus gracilis, ad 3·5 cm. longus, basi amplexitens, haud auriculatus; folia caulina inferiora minus lobata, petiolo alato basi leviter auriculato; folia superiora sessilia, hastato-triangularia, apice breviter acuminata, basi auriculata, amplexicaulia, auriculis dentatis. *Capitula* in corymbum late ramosum, minute bracteatum, disposita, pedunculis filiformibus ad 1·5 cm. longis suffulta. *Involucri* bracteae exteriores aequales triangulariae, 0·75 mm. longae; interiores lineari-lanceolatae, 4 mm. longae, 1 mm. latae. *Flosculi* 16-23 pro capitulo. *Corolla* pallide flava, tubo 1·5 mm. longo, ligula 3 mm. longa, 5-dentata. *Antherae* 1·5 mm. longae, apice truncatae, basi breviter setiferae. *Achaenia* fusca, elliptica, compressa, valde costata, secus costas hispidula, 1·75 mm. longa, apice in rostrum tenue fuscum minute hispidulum, 2·75 mm. longum, angustata; pappus albus, uniseriatus, 3 mm. longus. *Receptaculum* papillatum.

Ubou, Chanuman, on banks of Mê Kong, *Kerr* 8386.

***Lactuca siamensis* Kerr** [Compositae—Cichorieae]; a *L. chinensi* Makino achenii rostro multo brevior, a *L. gracili* DC. capitulis maioribus acheniis longioribus brevius rostratis recedit.

Herba gracilis, erecta, glabra, ad 50 cm. alta. *Caulis* leviter striata. *Folia* radicalia longe petiolata, lineari-oblonga, apice rotundata, mucronata, basi longe attenuata, margine integra vel distanter minuteque mucro-dentata, ad 10 cm. longa, 2 cm. lata, petiolo ad 5 cm. longo suffulta; folia caulina similia, sed parviora, sessilia, basi interdum leviter auriculata, auriculis dentatis. *Capitula* in corymbum late ramosum disposita. *Involucri* bracteae 2-seriatae; exteriores triangulares, 0.75 mm. longae; interiores 11 mm. longae, 1 mm. latae, margine scariosae. *Flosculi* c. 10, lutei. *Corollae* tubus c. 3 mm. longus; ligula 7 mm. longa. *Achaenia* compressa, 6.5 mm. longa, in rostrum breve, c. 1 mm. longum, gradatim attenuata, 8–10 costata, costis minute scabridis; pappus albus, c. 4 mm. longus.

Lôi, Kao Krading, c. 1200 m., in open grassy ground, *Kerr* 8714.

Pentaphragma Winitii *Craib* [Campanulaceae—Campanuleae]; a *P. gamopetalum* Gagnep. caule brevior, staminibus corolla brevioribus, corollae lobis longioribus recedens.

Caulis brevis, crassus. *Folia* alterna, subelliptica, parum inaequilateralia, apice rotundata, basi cuneata, circa 15 cm. longa et 8 cm. lata, chartacea, sicca supra subviridia, subtus pallide brunnea, supra setulis brevibus sparse sed apud marginem crebrius instructa, subtus praesertim ad nervos barbellata, costa supra conspicua subtus lata prominente, nervis lateralibus utrinque 5–6 supra conspicuis subtus prominulis intra marginem anastomosantibus, ciliata, petiolo 5.5–7.5 cm. longo barbato suffulta. *Inflorescentia* spiciformis, axillaris, pedunculo communi ad 1 cm. longo incluso, ad 3.5 cm. longa; bracteae inferiores oblongo-spatulatae, circa 6 mm. longae et 3 mm. latae; pedicelli breves; bracteolae deficientes. *Calycis* segmenta 5, oblonga vel quadrata, apice rotundata, circa 3 mm. longa, 1.5–3 mm. lata, subintegra, nervis tribus, glabra. *Corolla* alba (ex *Winit*), carnosa, calyci subaequilonga, ad medium 5-lobata, lobis lanceolato-deltaeideis obtusis. *Filamenta* 1 mm. longa, antheris apiculatis filamentis subaequilongis.

Nan, Mê Sanian, 390 m., evergreen forest, *Winit* 1786.

Agapetes saxicola *Craib* [Vacciniaceae—Thibaudieae]; species foliis inter minora, corymbis paucifloris conspicue bracteatis pilis glanduloso-capitatis instructis, antheris dorso calcaratis distincta.

Frutex ad 1 m. altus (ex *Kerr*), ramosus, basi tuberosus; ramuli primo pilis longiusculis divergentibus glanduloso-capitatis instructi, mox glabri, demum ad 5 mm. diametro, cortice griseo vel brunneo-griseo obtecti. *Folia* elliptica vel oblongo-elliptica, apice obtusa, basi rotundata vel cuneato-rotundata, ad 2 cm. longa et 1.1 cm. lata, primo chartacea, mox coriacea, sicco subtus pallidiora, pagina superiore pilis paucis, inferiore pilis longioribus glanduloso-capitatis sparse instructa, costa supra impressa subtus prominula, nervis lateralibus utrinque 4–5 obscuris, margine revoluta, basi vel paulo supra basem glandula latere utroque saepissime instructa, breviter

petiolata. *Corymbi* e ligno annotino orti, saepissime triflori, floribus inclusis ad 3.5 cm. longi, rhachi basi perulata, bracteis inferioribus sterilibus sublanceolatis 1 cm. longis cum rhachi et pedicellis pilis glanduloso-capitatis tectis; pedicelli 1.5 cm. longi apice articulati; flores albi vel pallide punicei (ex *Kerr*). *Receptaculum* pilis longiusculis glanduloso-capitatis instructum, 2 mm. longum. *Calycis* segmenta deltoidea, acutiuscula, 2 mm. longa, 1.5 mm. lata, dorso pilis paucis glanduloso-capitatis instructa. *Corolla* campanulata, tubo 7 mm. longo extra pilis glanduloso-capitatis sparse instructo, lobis 6 mm. longis. *Filamenta* complanata, 4 mm. longa, pilosa, loculis 3.5 mm. longis apice tubuloso-productis, tubis 7 mm. longis ad 0.5 mm. supra basem cornubus duobus 1.75 mm. longis instructis. *Discus* glaber. *Stylus* 12 mm. longus, glaber; ovarii loculi 5.

Lôi, Kao Krading, 1200 m., on rocks, *Kerr* 8696.

XXXV—MISCELLANEOUS NOTES.

Birthday and Jubilee Honours.—We record with pleasure the conferment of the following honours:—C.M.G.—MR. E. HARRISON, Director of Agriculture, Tanganyika Territory, and MR. E. J. WORTLEY, O.B.E., Director of Agriculture, Trinidad. O.B.E.—MR. H. WOLFE, Deputy-Director of Agriculture, Kenya Colony. I.S.O.—MR. W. DALLIMORE, V.M.H., Keeper of the Museums, Royal Botanic Gardens, Kew. M.B.E.—MRS. NORA ALCOCK, Plant Pathologist, Department of Agriculture for Scotland, and MR. G. WALTON, Assistant Agriculturist, Northern Rhodesia.

DR. F. N. HOWES.—We record with pleasure the conferment of the degree of Doctor of Science on Mr. F. N. Howes, Botanist in the Museum Department, by the University of South Africa.

DR. E. D. MERRILL.—Dr. E. D. Merrill, Professor of Botany at Columbia University and Director-in-Chief of the New York Botanic Garden since 1930, has been appointed Professor of Botany and Administrator of the Botanical Collections at Harvard University.

MR. R. O. WILLIAMS.—Mr. R. O. Williams, Assistant Director of Agriculture, Trinidad, has been appointed Chief Horticultural Officer, Palestine. Mr. Williams, who left Kew in 1916, has done much valuable work on the flora of Trinidad during his term of office there.

MR. J. C. NAUEN.—Mr. J. C. Nauen, Horticulturist, Department of Agriculture, Bermuda, who left Kew in 1928, has been appointed Assistant Curator at the Botanic Garden, Singapore.

PROFESSOR WENT—We learn with regret, on going to press, of the death on July 24th, of Professor F.A.F.C. Went, F.L.S., Professor of Botany and Director of the Botanic Garden, Utrecht. An account of Professor Went's work will appear in a subsequent number of the Bulletin.

HENRY WILLIAM CLINTON-BAKER.—Mr. H. W. Clinton-Baker, the Squire of Bayfordbury, Hertford, who died at his home on April 19th, after an attack of pneumonia, was a frequent correspondent of Kew, and will be remembered for his interest in arboriculture, and particularly his devotion to conifers. He was born in 1865 and inherited the Bayfordbury estates on the death of his father in 1903. The pinetum at Bayfordbury, established by Mr. Baker's grandfather in 1837, became one of the most famous in the country. Here also flourish the celebrated cedars, planted in 1765 by Sir William Baker to celebrate the building of the house. It was a happy instance of heredity in tastes that the late Squire should be an enthusiastic student and cultivator of conifers. He made a considerable number of additions to the pinetum during his lifetime, and, shortly before the war, commenced the formation of a new pinetum at Bell's Wood, Bayford, where he has planted most of the new species of conifers introduced from Eastern Asia during the present century. Through his efforts and the co-operation of his brother, Admiral Sir Lewis Clinton-Baker, *Fokienia Hodginsii* and *Cupressus formosensis* were brought into cultivation. Mr. Baker's interest in conifers culminated in 1909 when he published two handsome quarto volumes, "Illustrations of Conifers," which contain life-size portraits of the cones and foliage of hardy conifers. A third volume followed in 1913. This work forms an important contribution to the literature of the group. The present writer has prepared a supplementary volume containing photographs of Chinese and other conifers introduced since 1913, and it is much to be regretted that Mr. Baker has not lived to see its completion.

A. BRUCE JACKSON.

The Liberty Hyde Bailey Herbarium.—The herbarium of cultivated plants formed by Dr. L. H. Bailey, of Ithaca, N.Y., has just been presented by him to Cornell University. It comprises over 125,000 mounted herbarium sheets, and includes types of new species of palms, *Carex*, *Vitis*, *Rubus* and other groups. Included in the gift, which will be known as the "Liberty Hyde Bailey Hortorium," in allusion to its character of a horticultural herbarium, are a library of 4,000 volumes, thousands of photographs, the buildings in which the collection is housed, and about a quarter of an acre of surrounding land.

The Archegoniatae*.—Prof. Bower states in his preface that this work deals with the same problem as “The Origin of a Land Flora,” though “it is in no sense a second edition of the earlier work.” There is, in fact, little resemblance between the two books. The twenty-seven years which have passed since the publication of the “Origin” have seen great changes in the organographic study of primitive vegetation. New facts have been discovered, new theories promulgated, while the influence of Size upon Form, with which subject Prof. Bower’s name is intimately connected, was a factor entirely ignored in 1908.

The plan of the work is entirely different from that of the “Origin.” The first 23 chapters deal with the various classes of the *Archegoniatae* mainly from a descriptive standpoint. They are treated progressively, starting with the *Anthocerotales* and terminating with the more recent *Filicales*. The second part, consisting of six chapters, is devoted to a series of discussions on features common to the *Archegoniatae* as a whole, e.g. “Alternation and the Land Habit,” and “The Conducting System.” The work closes with a general organographic analysis and a summary of results and conclusions.

It is inevitable that a work of this kind, supplied as it is with a wealth of illustrations, should be used as a textbook for students. Such, however, is not its primary object. The descriptive side of the work is the groundwork upon which Prof. Bower builds up, with his familiar dexterity, the probable story of Archegoniate plants.

Much of the interest of the book lies in the final eight chapters. The summing-up of the *Bryophyta* discloses an interesting point which may be new to some. One is familiar with the ventilation system of the *Marchantiales* and the foliar elaboration of the *Jungermanniales*, yet no Bryophyte has succeeded in combining these two features in one and the same individual. As Bower says, “Their stunted habit is itself a witness to their lack of morphological initiative in this matter.” It was, however, the sporophyte that eventually became dominant on the land and the vascular cryptogams form the main subject of Prof. Bower’s considerations.

The interrelationships of size and form have materially affected some of Prof. Bower’s earlier views as expressed in the “Origin.” He indicates the worthlessness of Jeffrey’s anatomical distinctions between the microphyllous Pteridophytes (“*Lycopsida*”) and the megaphyllous Pteridophytes (“*Pteropsida*”). The latter were characterised as possessing foliar gaps while the former were stated to be without them. As Prof. Bower points out, a foliar gap has no phyletic significance but denotes a size relation of the leaf to the axis which bears it.

* “Primitive Land Plants also known as the Archegoniatae” by F. O. Bower, Sc.D., LL.D., F.R.S. Macmillan & Co., Ltd., London, 1935. Pp. xiv + 658, 449 figures. Price 30/- net.

The telome theory of Zimmermann (1930), or rather a modified form of it, is successfully used by Bower in the interpretation of sporophyte morphology. The telome-unit is composed of a distal sporangium with a stalk supplied usually with a vascular supply. By the linking together of these constructional units in various ways, complex plant bodies may be produced. Prof. Bower finds it necessary to introduce the "enation," which is essentially a lateral, secondary and initially sterile structure, to account for such outgrowths as hairs, scales, spines and small photosynthetic leaves. He finds in Zimmermann's theory a valuable aid in clarifying "the relation of many floating facts already used comparatively but without linkage by specific designation."

Prof. Bower's new work is of the type we have come to associate with him—original, stimulating and written with a charm of style which few botanical writers could emulate. A few of his conclusions and hypotheses will undoubtedly be challenged by other workers in the same field, but that is inevitable and indeed not undesirable. Prof. Bower himself would be the last to suggest that his own personal opinions represented the final word that could be said on the subject.

"Primitive Land Plants" is fittingly dedicated to the friend and former colleague of the author, the late Dr. D. H. Scott, whose famous researches on fossil plants were complementary to those of Professor Bower.

F. BALLARD

Dominions Wild Flowers.*—Lady Rockley has performed a signal service, in this year of the Jubilee of His Majesty the King, in publishing her beautifully-illustrated book "Wild Flowers of the Great Dominions of the British Empire."

At a time when the Dominions and Colonies of the British Empire are so much in our thoughts, Lady Rockley's delightfully-written account of her travels in Canada and Newfoundland, British Columbia, Australia and Tasmania, New Zealand, South Africa, Natal, Rhodesia and Kenya—illustrated mainly by her own vivid and faithful water-colour sketches—cannot fail to be of very great interest not only to gardeners and plant-lovers of the British Isles, but also to lovers of flowers overseas.

The first section of the book, dealing with Canada, Newfoundland and British Columbia, contains a well-written account of the conifers, which are so striking a feature of the Dominion; and the water-colour drawing "Among the Firs of British Columbia" is a fine example of the author's skill as an artist. This is followed by an account of the early spring flowers to be met with throughout the Dominion; an account which will vividly recall the carpets of beauty to those who have seen the spring display of flowers—many

* "Wild Flowers of the Great Dominions of the British Empire" by The Lady Rockley, C.B.E., Citizen and Gardener of London. Macmillan & Co., Ltd., 1935. Pp. xii + 380. Illustrated. Price 16s.

of which we treasure in our gardens—and which will fire those who have not visited the Dominion with a keen desire to do so. The summer flowers, shrubs and plants bearing edible berries are dealt with in detail, special mention being made of the lilies and interesting orchids native to Canada and British Columbia, some of which are well figured.

One hundred pages of the book are devoted to an account of the flowers and trees of Australia, none too many for the wealth of material to be found in the Commonwealth the flora of which she so fully describes. Possibly the most interesting of Lady Rockley's series of flower studies is her plate of the remarkable West Australian orchids of the genus *Caladenia*, and many will consider the sketch of "The Old White Gum" the best picture in the book. It certainly will appeal to all those who have been in the country and have viewed similar landscapes.

The unique and beautiful flora of Western Australia gives scope alike for her pen and her brush where the Christmas tree (*Nuytsia*), Leschenaultias, and the various kangaroo paws (*Anigozanthos*) are among some of the more remarkable plants in this botanical paradise.

The New Zealand flora, with its tree ferns, Cordylines, *Metrosideros* and *Leptospermums*, is described and illustrated in the next fifty pages, and a fine picture of the beautiful white New Zealand alpine flowers is well reproduced. This includes *Ranunculus Lyallii*, so fine a plant in its native home but so difficult to grow successfully at home, *Celmisias*, *Clematis indivisa*, and the New Zealand Edelweiss, *Leucogenes*. The white-flowered *Ourisias*, *Senecio scorzoneroides*, and many white-flowered *Veronicas* (*Hebe*) which occur on the higher mountains, might also have been included, but they are fully referred to in the text.

The rest of the book, some 116 pages, is devoted to the flowers and general vegetation of South Africa, Rhodesia and Kenya. Only one of the nine excellent plates in this section is reproduced from Lady Rockley's drawings; this is a characteristic collection of nineteen wild flowers brought together from many different localities.

It is impossible in a brief review to do justice to the book, which must be read throughout in order to gain—as one can—a very true and comprehensive impression of the flowers of the Dominions. Lady Rockley has certainly achieved her aim and purpose with singular ability in conveying a vivid picture of the wealth and variety of the trees and flowers and of their brilliant colouring, and of the wide expanses of desert and veld. When one knows the rapidity with which she travelled and the vast distances she covered, often making her sketches from train or car, Lady Rockley is to be congratulated on having presented to plant lovers both at home and overseas so arresting a picture of the botanical wonders of the British Dominions. By her book she deserves to be styled not only "a citizen and gardener of London" but also of the British Dominions.

The Botanist in Ireland.*—Dr. Praeger, with the publication of this volume, has further increased the great debt owed him by professional and amateur botanists in all parts of the world. The task of writing a scientific work which, at the same time, is intended to serve as a guide book for a botanical holiday is no easy one, and we know of few authors who could have performed it so successfully as Dr. Praeger.

The work is divided into four sections. The first deals with the geology, topography and climate of the country. There is a striking photograph of *Dryas* and *Habenaria intacta* growing side by side, showing the mixture of climatic types in Western Ireland. In the second part the author discusses the several botanical features of the country from many aspects, including ecological divisions and the effect of human interference. Especially useful is a series of notes on rare or interesting plants in the Irish flora. Here much information is gathered together in one place that hitherto had to be sought in scattered books and periodicals.

The main section of the book consists of an account of the Irish flora arranged topographically. For example, under the general heading of the County of Cork there are three sub-headings, Cork City, the Bandon-Kinsall area, and West Cork, under each of which are described the features most worthy of note to the botanical traveller in that particular area. Scattered through this section are numerous maps, plans, geological diagrams, bibliographies, lists of plants, and plates of localities and plants of special interest. This section must be unique in botanical literature and gives the reader an extraordinarily vivid yet scientifically accurate picture of the floral wealth of Ireland.

The last section comprises a Census List of the flora based on the standard of the 11th edition of the London Catalogue, the counties in which each species occurs being indicated by numbers. This list gives in convenient form a summary of the same author's "Irish Topographical Botany" and its Supplements. A very full index completes the work.

In a short review it is impossible to deal in any detail with a volume so packed with information. The novel use of section numbers in place of page numbers is on the whole successful, though the transition to page numbers for the Census list is, perhaps, somewhat confusing. One feature must be singled out for special mention. The plates, the majority of which are from photographs by Mr. R. Welch, are exceptionally fine, combining artistic beauty with a faithful representation of the types of vegetation depicted. Dr. Praeger is to be congratulated on producing a volume which is worthy of his long and patient study of the flora of his native country and which will be an inspiration to many others to follow in his steps.

* By R. Lloyd Praeger, D.Sc. Hodges, Figgis & Co., Publishers to the University, Dublin, 1934. Pp. xii + 587 (sections). Figs. 28. Plates 44. Price 12s. 6d.